THE UNIVERSITY OF TEXAS AT AUSTIN Date: 9/1/2016

RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name: Foster, John T. EID: jf28456 Present Rank: Assistant Professor

Years of Academic Service ***(Include AY 2016-17 in each count)***:

At UT Austin since: 9/1/2014 (month/day/year) Total Years at UT Austin: 3

In Present Rank since: 9/1/2014 (month/day/year) Total Years in Present Rank: 3

Tenure-track only:
Number of Years in Probationary Status: 3

Additional information: Accelerated

Primary Department: Petroleum and Geosystems Engineering

College/School: Engineering, Cockrell School of

Joint Department: N/A

College/School: N/A

Other Department(s): Aerospace Engineering and Engineering Mechanics

Recommendation actions[1]:

By Budget Council/Executive Committee: Promote

Vote[2] for promotion 9; Against 0; Abstain 0; Absent 0; Ineligible to vote 1

By Department Chair: Promote

By College/School Advisory Committee: Do Not Promote

Vote[2] for promotion 1; Against 6; Abstain 0; Absent 0; Ineligible to vote 0

By Dean: Promote

Administrative Action: Promote to Associate Professor

Date Action Effective: September 1, 2017
(To be submitted to the Board of Regents as part of the annual budget.)

By: Marvin Mecham For the President Date: December 15, 2016

[1]See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels.
[2]Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members. The number of committee members ineligible to vote should also be recorded. Enter zero where it would otherwise be blank.

EXHIBIT
P's 149

Dean's Assessment
John T. Foster
Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

Dr. John Foster received his BS and MS in Mechanical Engineering from Texas Tech University in 2002 and 2004, respectively, and his PhD in Aeronautics and Astronautics from Purdue University in 2009. Dr. Foster was a member of the technical staff at Sandia National Laboratories for seven years (2004-2011)[1]. Dr. Foster also held an adjunct faculty position at the University of New Mexico for the 2010-11 academic year.

Dr. Foster was appointed as an assistant professor in the Department of Mechanical Engineering at the University of Texas at San Antonio (UTSA) in September 2011. In September 2014, he joined the faculty in the Department of Petroleum and Geosystems Engineering at the University of Texas at Austin (UT) as an assistant professor. In January 2015, he received a courtesy appointment in the Department of Aerospace Engineering and Engineering Mechanics (ASE/EM). He is also an affiliated faculty member in the Institute for Computational Engineering and Sciences (ICES).

If successfully promoted to associate professor in September 2017, he will have accumulated three years of probationary service at UT, and he will have served in rank as an assistant professor (at UTSA and UT) for a total of 6 years. While this case is considered to be an early promotion when considering Dr. Foster's time at UT only, his total time in rank is consistent with our normal timeline.

Fifteen external review letters were requested. Seven letters were received, seven requests were declined, and one person did not respond. Of the letters received, four reviewers were selected by the budget council, one was selected by the department chair, and two were recommended by Dr. Foster. Of the declinations, two reviewers were selected by the budget council, two reviewers were selected by the department chair, and three were recommended by Dr. Foster.

Five letter writers are faculty at US universities: Minnesota, Illinois, Penn State, Oklahoma, and Texas A&M. One letter writer is a distinguished member of the technical staff at Sandia National Laboratories, and one is a retired senior fellow from ConocoPhillips. Two of the letter writers are members of the National Academy of Engineering (NAE).

Teaching

Dr. Foster has taught two undergraduate courses at UT (PGE 334, *Reservoir Geomechanics*, and PGE 323M, *Reservoir Engineering III*) and one graduate course (PGE 379/383, *Advanced Geomechanics*). He has taught PGE 334 twice, with class sizes of 81 and 25 students, and instructor ratings of 3.4 and 4.3, respectively. Dr. Foster taught PGE 323M once, with a class size of 65 students and an instructor rating of 4.1. He taught PGE 379 twice, with class sizes of 13 and 14 students, and instructor ratings of 4.3 and 4.9, respectively.

[1] Dr. Foster participated in the University Part-Time Program while working at Sandia. He worked half-time throughout his PhD studies. He was in residence at Purdue during the 2007-08 academic year and returned to full-time status at Sandia after graduating in December 2009.

Average instructor ratings in PGE for assistant professors teaching undergraduate and graduate courses are 4.17 and 4.19, respectively. Corresponding averages in the Cockrell School of Engineering are 4.17 and 4.34, respectively. Excluding the first time he taught PGE 334, Dr. Foster's instructor ratings in the undergraduate courses are near the departmental average, and his scores for the graduate course are considerably above the departmental average.

A senior faculty conducted a peer review of Dr. Foster's class in April 2016. The evaluator concluded that Dr. Foster was a very good teacher and presented the technical information in a systematic manner that was easy for the students to understand.

Dr. Foster is an innovator in flipping the classroom. He began this approach with a course on high performance computing that he developed at UTSA, and has used this approach in all three of his courses at UT. He displays Powerpoint slides using a tablet computer and he writes directly on the tablet as he lectures. He captures his voice and the annotations in real time. After each class, Dr. Foster divides the recording into four or more segments, and posts the segments on Canvas and/or YouTube for the students to access. These recordings are also used by students outside of UT. For example, the YouTube tutorials that he developed for high performance computing have been viewed more than 230,000 times (corresponding to a total of 800,000 minutes of viewing time).

Research

Dr. Foster's research focuses on computational and experimental mechanics. His main contributions are in three areas: (1) high-strain rate material characterization and modeling, (2) fundamental contributions to the theories and computational methods related to peridynamics and nonlocal modeling, and (3) development of a new class of hydraulic fracture models. At UT, Dr. Foster has articulated a vision of coupling geomechanics into traditional reservoir simulations to efficiently and safely bring unconventional resources into production. This approach is challenging, because introducing geomechanics will greatly increase the complexity and computational expense of these simulations. Highlights of Dr. Foster's research include:

- Seven archival journal papers in rank at UT and 12 in rank at UTSA (career total of 22). Dr. Foster's post-docs are the first author on five of his seven papers in rank at UT. He wrote one paper at UT with his PhD student.
- Ten of his papers in rank at UT and UTSA appear in high-impact journals, including *Computer Methods in Applied Mechanics and Engineering* (IF=3.467), *Communications in Nonlinear Science and Numerical Simulation* (2.834), *Computational Mechanics* (2.639), *Journal of Computational Physics* (2.556), *Computational Material Science* (2.086), and *International Journal of Solids and Structures (2.081).*
- Dr. Foster is one of four editors of *The Handbook of Peridynamic Modeling*, which will be published by CRC Press in November 2016.
- An h-index of 9 (Google Scholar), with 275 citations.[2]

Dr. Foster has been very successful in securing research funding from external sources. He has been the sole PI on nine external grants and a co-PI on two. Total research funding in rank (at UT and UTSA) is $10.3 million, with his share being $2.4 million. It is important to note that he is a co-PI on a $7.5-million Multidisciplinary University Research Initiatives (MURI) award from the Air

[2] While working at Sandia, much of Dr. Foster's research was sensitive in nature, and could not be published in the open literature. He did publish internal technical reports at Sandia, but those documents are, by definition, not considered in standard citation measures.

Force Office of Scientific Research related to predicting material failures using peridynamics modeling. The University of Arizona hosts this center, and the other universities are Nebraska, Columbia, and Arizona State.

Before moving to UT, Dr. Foster received a $1.6-million award with Mukul Sharma (PGE) from the National Energy Technology Laboratory. He has also received research funding from Sandia, the Army Research Laboratory, the Army Research Office, and GE Global Research.

The external letters – and the internal letter from Tinsley Oden (ICES) – highlight the importance of Dr. Foster's research accomplishments, and uniformly support his promotion:

Emmanuel Detournay[3] (Minnesota, NAE) writes, "It is clear, from the reading of these contributions [the five most significant papers] that Dr Foster has significantly contributed to the extension of the original peridynamics paradigm. ... After reading these papers, I very much appreciate the rigor of the approach, as well as the systematic effort of proving that the peridynamic formulation indeed degenerates gracefully to the appropriate classical (local) continuum model." Detournay concludes, "Dr Foster has developed a vibrant research program at Austin. I foresee a bright future for him, with continued excellent contributions to computational mechanics. He has my undeserved [sic] support for his promotion to the position of Associate Professor at the University of Texas at Austin."

Derek Elsworth[4] (Penn State, NAE) states that had never met Dr. Foster, nor read his work before writing this letter of reference. He discusses Dr. Foster's future promise as, "This is probably the strongest portion of his dossier – working at a relatively sophisticated and advanced level in the general area of computational mechanics, and although some of his topical choices are no doubt dictated by his prior (pre-PGE) engagement and interests at Sandia and otherwise, his potential to complete high-quality and profession-leading research is high. His strong mechanics background makes this a straightforward transition – no doubt his ability to ask the important questions in his (new) discipline will evolve with his continuing engagement within his revised research trajectory." Elsworth concludes, "In summary, the candidate has already made significant contributions to the literature in his original area of study (computational mechanics in general with an emphasis on peridynamics and mesh-free methods) and is redefining his research direction in closer alignment with his current position and interests. His success in this is apparent in his awards (AFOSR), funding (which is significant) and in publication in important journals in his field. He is certainly deserving of tenure and promotion in a research-one institution – which I support without reservation."

Armando Duarte[5] (Illinois) began his letter with comments about a recent presentation, "I recall very well his excellent plenary lecture at Eighth International Workshop Meshfree Methods for Partial Differential Equations held in Bonn, Germany, last fall. He presented his work on multi-physics models for hydraulic fracture simulation and also recent fundamental theoretical advancement of the peridynamic theory of porous media fracture. His peridynamic model was, to my knowledge, the first to simulate poroelasticity and fluid-driven fracture propagation. Applications of his method include the simulation of hydraulic fracturing of oil and gas reservoirs."

---

[3] Endowed Chair, Department of Civil, Environmental and Geo-Engineering
[4] Professor, Department of Energy and Mineral Engineering
[5] Professor, Department of Civil and Environmental Engineering

Duarte notes that "Dr. Foster is very comparable in stature and development to the top young computational mechanics faculty at leading universities in the United States." He goes on to compare Dr. Foster favorably to recently promoted faculty at Columbia University, Vanderbilt, and UIUC.

Ahmad Ghassemi[6] (Oklahoma) writes that he does not know Dr. Foster, but he is "familiar with his work and his reputation in the computational aspects of hydraulic fracturing;" "familiar with his work on developments in peridynamics to model fracture propagation in porous media;" and "aware that a number of investigations have used his open-source codes." Further, Ghassemi notes that, "Dr. Foster has established himself as a major player in peridynamics for hydraulic fracturing. He is clearly well recognized for his contributions to numerical methods and computational mechanics and is on track for further professional growth and leadership."

Brad Boyce[7], (Sandia National Laboratories) commented on Dr. Foster's reputation within Sandia, "In spite of John's brief tenure at Sandia, he had already established himself as 'the' internal expert on the application of peridynamics to problems in fracture. While Dr. Stewart Silling invented peridynamic theory at Sandia, it was clear that Stewart deferred to John with regard to how best to apply peridynamics to fracture of ductile metals. ... Moreover, I found John's dual expertise with both computational and experimental methods to be a rare and powerful combination. He is simultaneously quite practical yet steeped in rigorous theory. When John left Sandia several years ago, he left a vacuum of expertise that has been difficult to replicate." Boyce provides an interesting perspective on Dr. Foster's technical capabilities, "What is particularly telling is that at least two of John's major research projects come as a sub-investigator on a much larger effort: in those cases, top professors sought out John's capability as a clear 'rising star'. They risked engaging a new professor at a mid-tier university[8] because they were convinced that John would make a substantial technical contribution."

Lee Chin[9] (ConocoPhillips) notes that "My expertise is in the areas of geomechanics, coupled geomechanics and reservoir simulation, development of computer models and numerical simulators, and numerical modeling. I don't know Dr. John Foster. However, I have been following his technical publications over the past 4 years because of his innovative research work in using peridynamics. Thus, I am familiar with his research on applying peridynamics for solving challenging and important problems associated with solid/fracture mechanics and fluid flow." Chin further states, "In the area of computational mechanics with applications to geomechanics and fracture mechanics, I believe Dr. Foster is one of the best scholars/researchers compared with others in his cohort at research-intensive universities such as Stanford University, Texas A&M University, Colorado School of Mines, University of Oklahoma, and University of Calgary."

Peter Valko[10] (Texas A&M) comments on the technical content of Dr. Foster's papers, "It is a pleasure to read the various suggestions in Dr. Foster's papers, for instance regarding how fracture propagation or Darcy's law are handled in peridynamics. The publications show deep understanding of solid and fluid mechanics as well as abundant creativity." Valko did note that only five of Dr. Foster's publications had been cited 15 or more times, and commented, "This is a reasonable good result considering the author's age but the numbers are somewhat smaller than I

[6] Endowed Chair, School of Petroleum and Geological Engineering
[7] Distinguished Member of the Technical Staff
[8] Dr. Foster was an assistant professor at UTSA when both of the proposals described by Dr. Boyce were submitted.
[9] Reservoir Engineer Fellow (retired)
[10] Endowed Chair, Department of Petroleum Engineering

anticipated." This observation does not appear to be a serious concern for Valko, as he has "no doubt that Dr. Foster would be promoted to the ranks of associate professor at any research intensive university."

Tinsley Oden[11] also provided feedback to regarding Dr. Foster's participation in ICES, "I have followed his research closely, heard him lecture on contemporary topics in computational mechanics, geomechanics, materials science, hydraulic fracture and crack propagation, peridynamics, and other subjects. ... I have talked with him at length about deep topics at the forefront of contemporary computational science and engineering. I am fully convinced that he is a truly exceptional academic, a top intellect and expert in his field, a strong and innovative researcher, a dedicated teacher, a trustworthy faculty colleague, and a true, loyal supporter of his department and our university." Oden further notes, "Foster is a person of extraordinary breadth. He is able to work at a very high level in many different areas of engineering. His quite innovative work on modeling hydraulic fracture must stand among the most innovative and important in this area. It demonstrates that he has successfully turned his attention to important problems in petroleum engineering."

As discussed in the introductory remarks, seven people (including two NAE members) declined requests to provide letters for Dr. Foster. Five of the potential reviewers cited a lack of expertise in Dr. Foster's primary area of research and/or other commitments. Two potential reviewers questioned if Dr. Foster belonged in a department of petroleum engineering.

- Stephen Holditch[12] (Texas A&M, NAE) notes, "I know nothing about his specialty and I am not impressed with his publications for most of his career as I do not see how they fit well in Petroleum Engineering."
- Mohamed Soliman[13] (Univ. of Houston) writes that Dr. Foster "is obviously a smart person with excellent publications, however, most of them do not even belong to Petroleum Engineering field."

Advising and Student Mentoring

Dr. Foster graduated one PhD student from UTSA in 2014. The student moved to UT with Dr. Foster and served as a post-doc before moving to the Army Research Laboratory. One post-doc at UTSA also moved to UT with Dr. Foster.

Dr. Foster is currently supervising seven PhD students (two are co-supervised). Three of these students have passed their qualifying exams, but none has graduated. Dr. Foster graduated five MS students at UTSA, and is currently supervising two at UT.

University Service

Dr. Foster serves on several departmental committees (undergraduate studies, graduate admissions, and department awards) and the Cockrell School honors committee.

[11] Endowed Chair and Director, Institute for Computational Engineering and Sciences
[12] Endowed Chair and Head, Department of Petroleum Engineering
[13] Endowed Chair and Department Chair, Department of Petroleum Engineering

Professional Service
Dr. Foster is very active in several professional organizations. He helped organize three workshops sponsored by the US Association for Computational Mechanics. He also helped organized eight different symposia, mostly associated with the Computational Mechanics Committee within the American Society of Mechanical Engineers.

Other Evidence of Merit or Recognition
Dr. Foster received an Air Force Young Investigator Award in 2013. To recognize his outstanding and innovative contributions to teaching, he received the Petroleum Engineering Innovative Teaching Award from the Society of Petroleum Engineers in 2015.

Overall Assessment
Dr. Foster is a strong teacher and an innovative researcher. He has successfully secured significant research funding, both as a sole PI and as part of multi-institutional research grants. He is currently supervising a large research group. His publication record over the past five years is strong, but his total number of citations is adversely affected by his limited ability to publish in the open literature while employed at Sandia National Laboratories.

The members of the Promotion and Tenure Committee do not believe that Dr. Foster meets expectations for promotion to associate professor with tenure. They have three primary concerns:

1. Dr. Foster published three papers in journals with modest impact factors since he joined UT.
2. He has not graduated a PhD student from UT. Although one of his PhD students graduated from UTSA, they are concerned that the standards are not the same at the two schools.
3. They were concerned by the large number of potential referees who declined to write letters for Dr. Foster, and in particular, the comments provided by Holditch and Soliman.

Each of these issues is discussed below.

Dr. Foster did publish three papers during the past two years in the journals with modest impact factors: *Physica E: Low-dimensional Systems and Nanostructures* (1.904), *Physica A: Statistical Mechanics and its Applications* (1.785), and ASME *Journal of Applied Mechanics* (1.357). However, during that same period, he published four papers in journals with much higher impact factors. There are many reasons why an assistant professor may choose to publish in a particular journal, and I am not particularly concerned. He has selected a wide variety of journals to publish his work, and I am hopeful that with a little mentoring, he will focus on the more prominent journals in the future.

Dr. Foster has been in residence at UT for two years. Unless a very senior graduate student moved to UT with him, it would not be possible for him to graduate a PhD student in this time period. While at UTSA, Dr. Foster did work with graduate students and post-docs at UT (joint project with Mukul Sharma) and at Northwestern (as a result of the MURI competition, Wing-Kam Liu and Ted Belytschko reached out to collaborate with Dr. Foster). There is every indication that Dr. Foster is an outstanding mentor, and I do not believe that Dr. Foster's promotion should be delayed for several years while he waits for a PhD student to graduate from UT.

Finally, Holditch and Soliman expressed opinions in email correspondence after a cursory review of Dr. Foster's CV. I do not believe that these opinions should be given the same weight as those of the external reviewers who provided detailed assessments. These opinions are also in direct conflict with those of several the reviewers who found very close ties between Dr. Foster's work and

important topics facing petroleum engineers today and in the future. As noted by Jon Olson, PGE department chair, one of the strengths of the Department of Petroleum and Geosystems Engineering at UT is that many of the faculty did not earn their degrees in petroleum engineering. By recruiting faculty with interests in petroleum engineering, but backgrounds in other areas, the department has a long history of developing unique solutions to the problems facing the oil and gas industry. The department has been extremely successful using this strategy for hiring faculty, and I believe that Dr. Foster will continue this tradition.

In conclusion, I strongly disagree with the members of the Promotion and Tenure Committee. Dr. Foster is a rising star in the areas of experimental and computational mechanics, and I believe that he meets or exceeds expectations for promotion to associate professor with tenure in all areas. I support his case without reservation.

Sharon L. Wood, Dean
21 October 2016

Chair's Statement
John Foster, Petroleum and Geosystems Engineering
Promotion from Assistant to Associate Professor with Tenure

Summary Statement

I fully support the Budget Council's unanimous decision to promote Dr. John Foster from Assistant Professor to Associate Professor with tenure. He has met or exceeded expectations in teaching, research and service to the Department of Petroleum and Geosystems Engineering (PGE), to the Cockrell School of Engineering, to The University of Texas at Austin, and to the broader scientific and professional community. Dr. Foster received a PhD in Aeronautics and Astronautics from Purdue University in 2009. He has BS (2002) and MS (2004) degrees in Mechanical Engineering from Texas Tech University. He started as an Assistant Professor in the Mechanical Engineering department of The University of Texas at San Antonio in fall 2011, where he spent 3 years. He has been at UT-Austin for 2 years, completing 5 years as an assistant professor in August 2016, and is thus going up for promotion at the customary time.

Budget Council Discussion and Decision

The promotion process started with the solicitation in June of external letters. The candidate submitted his statements and supporting materials over the summer and these were made available for Budget Council review a week prior to our August 23, 2016 meeting, along with the external and internal referee letters. The PGE Promotion and Tenure Committee completed its draft statements on teaching, research and service prior to the August 23 meeting.

The main point of Budget Council discussion was concerning Foster's timing for going up for promotion, as he has not yet used his entire probationary period available to him at UT-Austin. It was stated that although he has only been at UT-Austin for two years, he has been an assistant professor for 5 years, and this would be the normal time to go up for promotion and tenure. Another comment was that it was clear that he has a strong record, and there is no reason to hold him back. In particular, it was mentioned that his publication numbers are high relative to other assistant professors, and his teaching and service were both good. One member mentioned that he deserves generous support from the Budget Council. The second point of discussion was the negative responses to requests for reference letters received from Holditch (A&M) and Soliman (University of Houston). No one thought those responses should be seriously considered. The main concern voiced in the refusals was that Foster's work doesn't necessarily belong in a petroleum engineering department – this opinion was not shared by any on the Budget Council. It was admitted that Foster is transitioning in the focus of his work since leaving a mechanical engineering position at UT-San Antonio, but he has only been at UT-PGE for two years. The Budget Council was happy that he is making good progress in working to apply his skills in petroleum related problems.

The final vote of the Budget Council was unanimous in support of Dr. Foster's promotion, with 6 votes cast by those in attendance at the meeting and 3 votes in absentia. The date of the meeting was set two weeks in advance. One absentee member had indicated he was not available after the meeting date

was set, but never participated in the Doodle Poll determining the time. The second absentee voter had originally indicated that he was available for the meeting, but indicated a conflict the week before. The third never responded in reference to availability, so was expected to attend but did not show.

Chairman's Analysis of Teaching

The typical teaching load for an assistant professor in PGE is 3 courses per year. New hires typically get some teaching relief, teaching only one course per semester (2 per year) for a year or two. Dr. Foster, being an experienced assistant professor, was given one year of reduced teaching (1 and 1).

One of the things that impressed me the most about John Foster when he interviewed was his innovative and accomplished teaching. He had put together an advanced class in computational methods at UT-San Antonio, with a significant component of hands-on coding in the classroom, and he had pioneered a lecture capture methodology that had made him a leader in views on YouTube. His lecture capture method, which he has implemented at UT-Austin and propagated to at least 3 others on our faculty, involves using a tablet for free-hand writing and powerpoint slides. The tablet is projected onto the screen in the classroom and is recorded along with his voice. Immediately after class, he divides the 50 or 75 minute lecture recording into 4 to 7 conceptually coherent segments, and posts them to Canvas so that students can review the parts that for which they need further help. He also posts these lectures on his public YouTube account and has thousands of followers using his lectures for learning (for his High Performance Computing class, he has 230,000 unique views and 800,000 minutes of viewing time). Another affirmation of the value of this teaching method is his 2015 Society of Petroleum Engineers (SPE) Innovative Teaching Award.

The details of Dr. Foster's teaching portfolio can be found in his statement and CV. I mainly want to comment on his ability to integrate into the petroleum engineering curriculum and the quality of his teaching at UT-Austin. Shortly after John was hired, I met with him to discuss the need to get him teaching within the core required undergraduate curriculum of the petroleum engineering program. He could obviously teach our PGE 334 Reservoir Geomechanics course (and he does), but we already had 3 others who could teach that with whom he must rotate, so I needed him to branch out. We agreed that a great opportunity for this would be the *PGE 323M Reservoir Engineering III: Numerical Simulation* course, which involved derivation and application of porous media flow equations and their conversion to a finite difference numerical method expression, with the goal of students writing their own computer code that can solve practical problems. His computational background made him a good candidate for this course. John enthusiastically engaged in this task, even though it meant delving into a topic he had never taught before. This task was made easier by the fact that he co-taught it with PGE Associate Professor Matt Balhoff the first time (each had their own section), but it was a substantial amount of work nonetheless. His first time teaching the course last fall (2015) was very successful, and he received good teaching evaluations from the students – 4.1 for the instructor and 4.0 for the course. I fully anticipate those to improve for this fall, when John is teaching the course on his own. His other undergraduate teaching evaluations show that he is an effective teacher that is willing to adapt. His first time teaching the undergraduate *PGE 334 Reservoir Geomechanics* course garnered instructor/course ratings of 3.4/3.2, but the second time that rose to 4.3/4.1. His graduate teaching shows similar

effectiveness and motivation for improvement. For *PGE 379/383 Advanced Geomechanics* (it is a combined undergraduate/graduate course, but was predominantly taken by graduate students), he received instructor/course ratings of 4.3/4.0 the first time the course was offered (fall 2015 – for some reason the course evaluations are solely listed for PGE 379, when they should include PGE 383 as well), while the second time in fall 2015 he improved to 4.9/4.6. Given these CIS scores and the general student feedback we have heard through our undergraduate coordinator and our graduate advisor, Dr. Foster's teaching is well received by the students. As far as being a versatile and effective member of the PGE faculty who can teach courses that help address our teaching load, I am very happy as a chair and know that I can count on John to perform well in the teaching tasks to which he is assigned. Consequently, my assessment is that Dr. Foster exceeds expectations in this category for promotion to associate professor with tenure.

Chairman's Analysis of Research

Dr. Foster's research focuses on mechanics and computational methods. He is a world leader in the new theory of peridynamics, which is a promising way to solve geomechanics problems in heterogeneous media with pervasive fractures. As he mentions in his own statement, it is quite remarkable that he co-authored a paper with the late Professor Ted Belytschko (Northwestern University professor, National Academy of Engineering and National Academy of Sciences member). Belytschko is known for developing new computational methods such as the element free Galerkin Method and the eXtended Finite Element Methods (XFEM), and it says much about both that there was a collaboration between a famous full professor at Northwestern University and a young assistant professor then at UT-San Antonio. Just as Belytschko's XFEM quickly progressed from being a new, relatively unknown computational method to rivaling standard finite element methods (FEM) techniques when treating fracture problems, peridynamics has the potential to shake the foundation of computational mechanics, at least with regard to fracture modeling (which is a hugely important space in numerous industries including petroleum, as fracture propagation is the key to failure in most material). To have a well-respected peridynamics pioneer such as John Foster to call UT-Austin his home has huge potential for recognition to come to the Cockrell School of Engineering. It is not guaranteed that peridynamics will "change the world", but the potential is strong, and Foster's funding and ability to publish numerous articles in prestigious journals is laying the foundation for continued success.

Another important aspect of rating a professor's research is relevance. From my perspective as someone who also specializes in mechanics (my specialty is geomechanics and hydraulic fracturing), anything that has to do with fracture is guaranteed to be a hot topic. In the oil and gas business, or in any case of drilling or excavating holes in the subsurface, fracture is a key problem to master, and can be exceptionally difficult given the bewildering heterogeneity and anisotropy often found in rocks and other geomaterials. Also, no one can ignore that horizontal wells and hydraulic fracturing have literally revolutionized the United States' domestic oil and gas industry, responsible for a doubling of our daily oil production. Dr. Foster's work is fundamental to much of what petroleum engineers do in drilling and in hydraulic fracturing. For instance, hole stability is a key factor in successful drilling, which must be mastered in order to prevent accidents like the Macondo Gulf of Mexico oil spill. Dr. Foster is collaborating with PGE professor Eric van Oort to apply his skills in this area. With regard to hydraulic

fracturing, Foster is collaborating with PGE professor Mukul Sharma to apply his numerical method to the especially difficult problem of fracture propagation in the presence of pre-existing flaws as found in shales, important because most of the increase in oil and gas production over the past 10 to 15 years has come from resources found in shales, which have made the US the top oil producing nation in the world again. I don't mention these collaborations to suggest Foster is not capable of independent thought and accomplishment – I have no doubt that he is capable and proven in that regard. I just mention this to demonstrate that though he is new to petroleum engineering, he has quickly adapted his research program to contribute in relevant areas where his expertise is unparalleled among the PGE faculty, and he is good at collaborating with others.

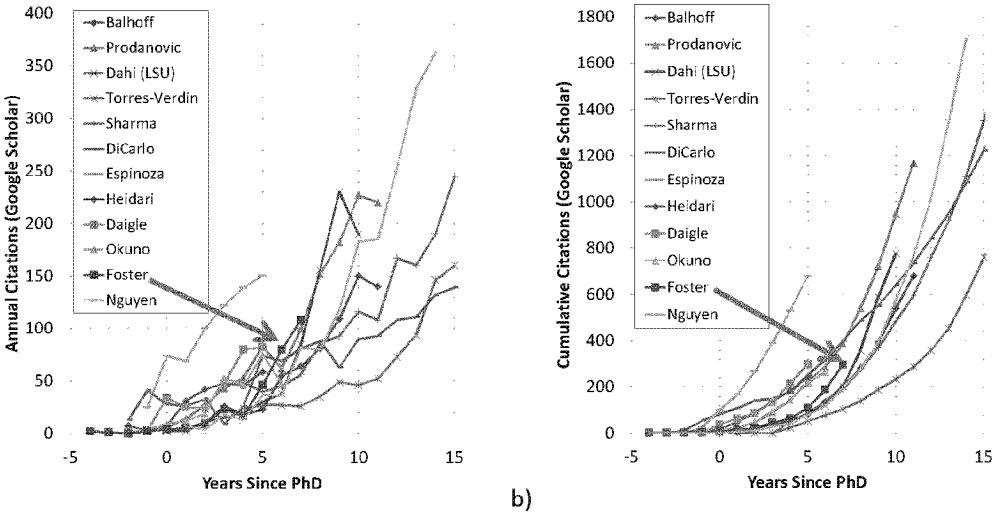
Where Dr. Foster really shines is in his research productivity. His *in-rank* journal publication number of 19 is very good as compared to the other PGE faculty promoted over the past 5 years (Table 1), ranking him 2nd out of the 5 most recently tenured and promoted PGE assistant professors. His *total* number of publications at promotion also compares well with the others, behind DiCarlo and Prodanovic but ahead of Nguyen and Balhoff. DiCarlo, with the most publications at promotion and tenure, benefited from a total career length of 19 years since receiving his PhD. Foster ranks favorably as 3rd of 5 for total number of journal papers at promotion with the shortest career since PhD of the group – just 6 years.

Table 1. Publications numbers when going up for promotion to associate professor

	In-Rank	Total	Date Promoted	Date PhD granted	Years since PhD at promotion
Prodanovic	22	31	2016	2005	11
Foster	***19***	***22***	***tbd***	***2009***	***6?***
DiCarlo	17	63	2013	1994	19
Nguyen	13	16	2011	2003	8
Balhoff	9	13	2013	2005	8

Citations are an interesting yet imperfect way to measure significance and impact of published papers. Foster's h-index of 9 (Google Scholar) and total citations of 254 (Google Scholar) seem modest, but it is hard to judge the value of such a number because of the high variability between disciplines and sub-disciplines. Foster's work in a new computational mechanics methodology may be suppressing his current citation numbers, but given the likely spread of the method to more wide acceptance in the computational community, his citations could explode. I have tried to normalize citation growth by years since PhD award date (Figure 1). Foster's citation numbers are actually quite competitive within the PGE department from this perspective, and he is actually ahead of where some of our very successful senior faculty were at the same time in their careers. Full professors on the plot are Torres-Verdin and Sharma, who show a slower build of citations than Foster, but each now has high total citations - 11,500 for Sharma (31 years since PhD) and 3500 for Torres-Verdin (24 years since PhD). They have h-indices of 56 and 29, respectively. Current Associate Professors Nguyen (14 years since PhD) and Balhoff (11 years since PhD) have higher total citations also, but Foster's cumulative curve is rising

earlier in his career than theirs, and he is rising faster than Dahi of LSU (a UT-PGE graduate), who is included because his discipline is more like Foster's. Associate Professors's DiCarlo and Prodanovic show faster cumulative builds than Foster, but he is competitive. Finally, of all the current PGE assistant professors (Espinoza, Heidari, Daigle, and Okuno), Foster is second only to Espinoza for number of annual citations this year, with 110 cites.



a) b)

Figure 1. a) Annual and b) cumulative citation data for a range of UT-PGE assistant, associate and full professors, plus a UT-PhD graduate specializing in hydraulic fracturing who is presently an Associate Professor in petroleum engineering at LSU. The arrow points at Foster's curve. Data source is Google Scholar, August 28, 2016.

Dr. Foster received 7 strong and compelling external letters that unequivocally support his promotion. I will highlight and analyze those shortly, but I first want to discuss numerous potential referees that turned us down (8 out of 15). Most of the individuals who declined to write cited lack of time or expertise pertinent to Foster's publications. Mark Zoback was on his way to a 10 day trek in the Pamir Mountains of Tajikistan! Dr. Foster's five significant publications focus on the new method of peridynamics, and they deal with the method in depth. Given that the analysis is complex and currently only familiar to a relatively small community, I can understand that some individuals would balk at the time investment that would be required to fully read and absorb the papers. Also, the community of viable referees at peer institutions is very small for us, so our pool was narrow to start with, and many other universities are likely making requests to these same individuals. Another factor is that some of the negative responses could be blamed on our process. It took some time to get answers from the initial 8 referees contacted, and by the time two more waves of requests went out, the summer was almost over. Frustratingly, two of the referees contacted initially said yes (Holditch and Ortiz) and then later said no, although I can't blame Holditch for delays as he was very prompt in his responses. One potential referee never responded (Clifton).

Overall, I think the high number of declining referees is very unfortunate in that it could reflect poorly on Dr. Foster, but I truly believe that it should not. I already addressed the general excuses of not enough time and lack of expertise. Let me now address the two email responses that were quite negative about Dr. Foster himself. Firstly, Steve Holditch (NAE) of Texas A&M is highly regarded in petroleum engineering, and has worked both in reservoir engineering and hydraulic fracturing. We felt it was important to get someone who was a recognized practical expert with some experience in hydraulic fracuring, but we knew he was not a hardcore mechanics expert. Unfortunately, I believe that lack of explicitly applicable expertise colored his response. His quote that needs addressing is "I am not impressed with his publications for most of his career as I do not see how they fit well into petroleum engineering. I guess it is ignorance on my part." I would argue that, as Holditch states, it truly is his ignorance of the applicability of Foster's computational mechanics work to drilling and hydraulic fracturing that prevents him from seeing the value to petroleum engineering. It is also short-sighted to not recognize the potential of having someone with such a strong fundamental and theoretical background on the PGE faculty. Petroleum engineering has traditionally been an interdisciplinary field, where engineers from many disciplines can flourish. Less than 1/4 of our own PGE faculty has a PhD in petroleum engineering (Sepehrnoori, Heidari, Okuno, Gray). The rest come from chemical engineering (Lake, Pope, Mohanty, Sharma, Nguyen, Balhoff), engineering geoscience (Torres-Verdin, and myself), chemistry (van Oort), math (Wheeler and Prodanovic), geology (Daigle), geotechnical engineering (Espinoza), and Physics (DiCarlo). Foster's heritage of mechanical engineering makes him typical in that he is a non-petroleum engineer. His work on computational mechanics is fundamental but of great applicability to petroleum engineering for a wide range of problems, including wellbore stability, hydraulic fracture mechanics, pipe/casing mechanics, and fluid flow and transport. There is no question in my mind that he has the expertise to make a difference in petroleum engineering, and he clearly has made strides in doing significant things that are petroleum-specific in the just two years he has been on the PGE faculty. He helped surpervise a recent Sharma PhD student, Ouchi, who refined an application of peridynamics to poro-elastic fracture propagation analysis. He is a co-author on two journal (#9 and #17) and one conference paper (#13) with Ouchi. It is more important, however, that Foster can thrive in our department doing fundamental work, developing a methodology that will impact petroleum engineering but will also be valuable to the broader engineering community.

Soliman of the University of Houston makes similar comments to Holditch in his declining to write a letter. "..most of his publications do not even belong to Petroleum Engineering... Frankly it looks like he belongs more to a mechanical or civil engineering department..." Such statements are basically reflecting the idea that all petroleum engineers must do practical application work, not fundamentals. That has never been the attitude of our department, and that is probably a key reason why we are the top rated graduate program, with Stanford as our only true potential rival. Consequently, I dismiss these negative comments of Holditch and Soliman as reflecting a viewpoint that does not fit with the vision of petroleum engineering as held by the faculty of UT-PGE.

From the seven letters we did receive, endorsement to promote was unanimous. Assessments from the external reviewers worth highlighting include:

- Emmanuel Detournay, University of Minnesota (NAE) – "I have read these papers carefully…and found them to be very well written and easily understandable. They are mostly published in high impact journals… Dr. Foster has significantly contributed to the extension of the original peridynamics paradigm… I very much appreciate the rigor of the approach, as well as the systematic effort of proving that the peridynamic formulation indeed degenerates gracefully to the appropriate classical … continuum model…. While there are other numerical contenders, peridynamics is an elegant and power approach… and is most likely here to stay…. There is no question that he has 'hit the ground running since joining the UT system. …I foresee a bright future for him…"
- C. Armando Duarte, University of Illinois at Urbana-Champaign – Seeing Dr. Foster giving a plenary lecture, …"it was clear…that he [is]… extending [peridynamics] to novel and exciting applications…These are research areas with important societal, environmental and economical implications… Dr. Foster has definitely demonstrated a remarkable ability to …branch out in different fields while building on the strength acquired during his graduate studies…. Dr. Foster is very comparable in stature and development to the top young computational mechanics faculty at leading universities in the United States….[such as] two recently promoted associate professors with research areas related to those of Dr. Foster: Dr. Haim Waisman, … Columbia University…. [and] Dr. Caglar Oskay, … Vanderbilt University. [He] is also comparable with recently promoted associate professors at the College of Engineering at UIUC…. My recommendation, with enthusiasm, is to promote…"
- Derek Ellsworth, Penn State University (NAE): "The candidate has made innovative contributions… [He has received] a significant number of awards given his early career standing. An AFOSR young investigator award stands out… his potential to complete high-quality and profession-leading research is high….I support without reservation."
- Ahmad Ghassemi, The University of Oklahoma – "Dr. Foster has made excellent progress in establishing a computational fracturing research program that has yielded high quality journal publications. …it is my view that he would certainly be granted tenure and promotion at a research-intensive university."
- Peter Valko, Texas A&M University – "…The publications show deep understanding of solid and fluid mechanics as well as abundant creativity…. he managed to place them in highly respected journals with outstanding impact factor… I fully support granting the rank of associate professor to Dr. Foster. I am convinced he will continue to grow and flourish as a valuable faculty member."
- Brad Boyce, Distinguished Member of the Technical Staff, Sandia National Laboratories – "…I found John's dual expertise with both computational and experimental methods to be a rare and powerful combination…I believe that John's career trajectory has tremendous 'headroom'…John has strong entrepreneurial acumen…"
- Lee Chin, Reservoir Engineering Fellow, Retired Conoco-Phillips – "I consider Dr. Foster to be one of the top experts in computational mechanics using peridynamics….This outstanding accomplishment (peridynamics) provides us an alternative that will be practical and competitive compared to existing numerical methods (FDM, FEM and BEM)… I believe Dr. Foster is one of

> the best scholars/researchers compared with others in his cohort at research-intensive universities such as Stanford..., Texas A&M..., Colorado School of Mines, University of Oklahoma and University of Calgary."

I think it is clear that these reviewers, two NAE members and five from peer institutions, are impressed with Dr. Foster's achievements as a junior faculty member. There are two additional letters, one from Noel Clemens, the chair of UT's Aerospace Engineering and Engineering Mechanics Department (Foster has a zero time joint appointment), and one from Tinsley Oden. Both are very good, but Tinsley's is particularly insightful and should be read in its entirety, so I will not paraphrase here. Such endorsement from one of Tinsley's stature is quite impressive.

Overall, my assessment is that Dr. Foster exceeds expectations in this category for promotion to associate professor with tenure.

Chair's Analysis of Advising, Counseling, and Other Student Service

With regard to graduate student supervision, Dr. Foster has graduated one PhD student and 5 MS students in his 3 years as assistant professor at UT-San Antonio (the PhD student graduated during Foster's first semester in Austin, but kept his registration at San Antonio). The PhD student published 3 papers in respected journals from his dissertation, and now has a job in the Army Research Laboratory, indicating his education under Dr. Foster's supervision was quite effective. In Dr. Foster's short 2 years in Austin he has not yet graduated any MS or PhD students, but he has an impressive pipeline of 9 PhD students (2 of which are co-supervised, and 3 of whom have passed the qualifying exam) and 1 MS student. I have served with him on PhD committees over the past 2 years, and there is no question that he is technically capable and skilled in working with students.

Chair's Analysis of Administrative and Committee Service

What I have found most pleasing about Dr. Foster's service role since arriving in Austin is that he is willing to serve, and does so happily. This attitude within the faculty is crucial for the health and longevity of a small department such as PGE. He attends and contributes to discussions in all faculty meetings, he attends departmental social and development events, and has established collegial relationship with all the faculty. He has also reached out to the Aerospace Engineering and Engineering Mechanics Department, getting appointed as a 0% time member, as well as being engaged in activities at UT's Institute for Computational Engineering and Sciences (ICES). As described in the letter by ICES director and Associate Vice-President for Research Tinsley Oden, his participation and work is highly valued. He clearly exceeds the expectations for promotion.

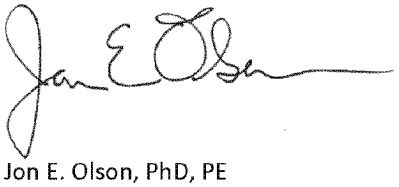
Chair's Analysis of Other Evidence of Merit or Recognition

Dr. Foster's most significant honor has been his receiving the Air Force Office of Scientific Research Young Investigator Award. He is extremely active in professional society technical meetings, and is in high demand as a keynote or plenary speaker related to computational mechanics. He has been an effective fund-raiser for his research and is working diligently to work toward the future, writing

numerous grant applications and developing a new project funded by General Electric's Global Research group. I have already mentioned his SPE teaching award. Again, Dr. Foster meets or exceeds expectations for promotion to Associate Professor.

Concluding Statement

Dr. Foster's accomplishments in rank as an assistant professor at UT-Austin across all categories meet or exceed expectations, as evaluated by the PGE Budget Council and prominent external referees. Combined with his previous 3 years at UT-San Antonio, Dr. Foster has accumulated the expected accomplishments for promotion and tenure. I enthusiastically support his advancement, think his work thus far is commendable, and believe his future potential is significant.



Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair

Dr. John Foster was scheduled to undergo his third-year review in Spring 2017.

DEPARTMENT OF AEROSPACE ENGINEERING & ENGINEERING MECHANICS
THE UNIVERSITY OF TEXAS AT AUSTIN
210 E. 24th Street, Austin, Texas 78712-0235, USA
Tel: +1-512- 471-7593 · Fax: +1-512-471-3788 · email: clemens@mail.utexas.edu

To: Prof. Jon Olson, Chair, Petroleum and Geosystems Engineering

From: Prof. Noel Clemens, Chair, Aerospace Engineering and Engineering Mechanics

Subject: Letter of Support for Dr. John Foster

Date: August 14, 2016

I am writing to highlight Professor John Foster's contributions to the department of Aerospace Engineering and Engineering Mechanics where he holds a courtesy appointment. Our department is very pleased to be affiliated with John because he is an outstanding young researcher and a good citizen who is always eager to participate in relevant department activities. For example, John regularly attends department faculty meetings, EAC events, he has helped us immensely with our faculty recruiting, and he routinely serves on our students' PhD dissertation committees. We view John as being a very visible and fully-integrated member of our department. John is also an active member of our department's Center for Mechanics of Solids, Structures and Materials (CMSSM), and I am glad to see that he is expanding his interdisciplinary activities by becoming an affiliate faculty member of the Institute for Computational Engineering and Sciences (ICES). John serves as an important bridge between our departments because he is a mechanician by training, but brings us knowledge about applications in petroleum engineering that are important for expanding the funded research portfolios of our affiliated centers. Furthermore, we are starting a new undergraduate degree program in Computational Engineering, and we hope that we can take advantage of a course that John developed at UTSA on high-performance computing should he begin teaching it in the PGE department.

John has an outstanding reputation as a mechanician, and several of our mechanics faculty members have mentioned how impressed they are with his technical abilities and the advanced state of his modeling methodology. His focus on peridynamics as a computational tool for solving complex problems in solid mechanics brings a welcome added dimension to the research being done in the mechanics of materials at UT Austin. Owing to this, our faculty members were very excited to have John formalize a relationship with our department with the courtesy appointment. John was also enthusiastically supported by the faculty for membership on our EM graduate studies committee, and he currently supervises three graduate students that are enrolled in the EM program. While John has already established strong collaborations with some of our

faculty members, he has sown the seeds of significantly more collaborations, which we expect to see come to fruition in the coming years.

In my opinion, John's desire to conduct interdisciplinary research epitomizes the characteristics that we seek in our new members and strive to develop in our existing faculty. I strongly support his case for promotion and tenure.

INSTITUTE FOR COMPUTATIONAL ENGINEERING AND SCIENCES
THE UNIVERSITY OF TEXAS AT AUSTIN

1 University Station C0200 • Austin, Texas 78712-0027
(512) 471-3312 • FAX (512) 471-8694

August 10, 2016

Professor Jon E Olson
Chair, Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering, Bureau of Economic Geology
Jackson School of Geosciences
The University of Texas at Austin
200 E. Dean Keeton, CPE 5.168B, Stop C0300
Austin, TX 78712

Dear Professor Olson,

I am writing to you to provide my strong recommendation for the promotion of Dr. John T. Foster to the rank of Associate Professor, with tenure, in your department.

I met John when he first came to UT a couple of years ago. I have followed his research closely, heard him lecture on contemporary topics in computational mechanics, geomechanics, materials science, hydraulic fracture and crack propagation, peridynamics, and other subjects. I have invited him to participate in seminars and to give lectures at ICES. I have talked with him at length about deep topics at the forefront of contemporary computational science and engineering. I am fully convinced that he is a truly exceptional academic, a top intellect and expert in his field, a strong and innovative researcher, a dedicated teacher, a trustworthy faculty colleague, and a true, loyal supporter of his department and our university.

Foster's record of high-level involvement in research and his own accomplishments have been truly remarkable. He earned a B.S. and M.S. in Mechanical Engineering at Texas Tech. In May of this year, I gave a Presidential Distinguished Lecture at Tech and talked with several members of the ME department. To many, John Foster is a legend, one they still admire and respect. He went on to get his Ph.D. in Aeronautics and Astronautics from Purdue in 2009. He was a senior member of the Sandia technical staff at Sandia National Laboratories from 2006-2011, an Assistant Professor of ME at UT San Antonio for three years, and joined our department of Petroleum and Geosystems Engineering in

2014. He was given a courtesy appointment in our own ASEM department around a year ago.

Foster is a person of extraordinary breadth. He is able to work at a very high level in many different areas of engineering. His quite innovative work on modeling hydraulic fracture must stand among the most innovative and important in this area. It demonstrates that he has successfully turned his attention to important problems in petroleum engineering.

I recently returned from the world conference on computational mechanics in Seoul Korea, where I ran into a number of colleagues from Northwestern, who had made John a strong offer to join their faculty some years ago. To this day, they are disappointed that he chose to stay in Texas. It was clear that some of them rank him as one of the best researchers and academics in the United States in his areas of expertise.

John has won the Young Researcher's Award from Air Force Office of Scientific Research, the SPE petroleum engineering teaching award, and an award for accomplishments for those under 40 in the San Antonio business journal. His publication record is quite strong publishing 22 articles in highly cited journals and one book chapter. While at UT, 14 conferences papers were submitted and he has compiled and co-edited a book on peridynamics published to be published by Taylor and Frances. His publication while an assistant professor at UT Austin are quite commendable. I observe he is frequently invited to give technical seminars at universities around the country, such as Northwestern, Johns Hopkins, and the University of Illinois.

He is extremely successful in securing funding for his research, bringing in over $2.44 million in research as a PI and another $2.29 million as a co-PI, which represents an extraordinarily successful proposal activity. He has successfully advised one Ph.D. student, James O'Grady, who is now at the Army Research Lab, and he has eight students in progress (3 of whom have passed qualifying exams), one master's student, and 3 post-docs.

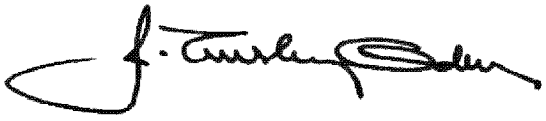
John Foster has established himself as a leading expert on the growing field of peridynamics and its application to the most complex problems in geomechanics, including remarkable new models of hydraulic fracture. His interest and expertise go far beyond this subject. He has a deep understanding of continuum mechanics, mechanics of porous

media, finite element methods, and contemporary methods in computational mechanics and computational science. He has a great deal of dedication, energy, discipline and excitement about his work.

I do not recall a more qualified individual at his academic level in my half-century experience as a university professor. He is an exceptional member of our faculty, and we should do everything we possibly can to keep him here, to encourage him to continue his work, and to provide him with the resources and opportunity to be successful in his field.

In my opinion, John Foster is highly qualified to be promoted to the rank of Associate Professor with tenure. He is on a trajectory that will carry him to the very top of his field. I strongly support his promotion and tenure.

Sincerely yours,



J. Tinsley Oden
Associate Vice President for Research
Director, Institute for Computational Engineering and Sciences
Cockrell Family Regents' Chair in Engineering #2
Peter O'Donnell Centennial Chair in Computing Systems
Professor of Aerospace Engineering and Engineering Mechanics
Professor of Mathematics
Professor of Computer Science

/cal

J. Tinsley Oden

Associate Vice President for Research
Director, Institute for Computational Engineering and Sciences
Cockrell Family Regents' Chair in Engineering No. 2
Peter O'Donnell Jr. Centennial Chair in Computing Systems
Professor of Aerospace Engineering and Engineering Mechanics
Professor of Computer Science
Professor of Mathematics

J. Tinsley Oden is the founding Director of the Institute for Computational Engineering and Sciences (ICES), which was created in January of 2003 as an expansion of the Texas Institute for Computational and Applied Mathematics, also directed by Oden for over a decade. The Institute supports broad interdisciplinary research and academic programs in computational engineering and sciences, involving five colleges and 18 academic departments within UT Austin.

An author of over 600 scientific publications: books, book chapters, conference papers, and monographs, Dr. Oden is an editor of the series, **Finite Elements in Flow Problems and of Computational Methods in Nonlinear Mechanics**. Among the 56 books he has authored or edited are **Contact Problems in Elasticity**, a six-volume series: **Finite Elements, An Introduction to the Mathematical Theory of Finite Elements**, and several textbooks, including **Applied Functional Analysis** and **Mechanics of Elastic Structures, A Posteriori Error Estimation in Finite Element Analysis** (with M. Ainsworth), and, more recently, **An introduction to Mathematical Modeling: A course in Mechanics**. His book with J.N. Reddy, **An Introduction to the Mathematical Theory of Finite Elements** was republished by Dover in 2011. His treatise, **Finite Elements of Nonlinear Continua**, published in 1972 and subsequently translated into Russian, Chinese, and Japanese, is cited as having not only demonstrated the great potential of computational methods for producing quantitative realizations of the most complex theories of physical behavior of materials and mechanical systems, but also established computational mechanics as a new intellectually rich discipline that was built upon deep concepts in mathematics, computer sciences, physics, and mechanics. Computational Mechanics has since become a fundamentally important discipline throughout the world, taught in every major university, and the subject of continued research and intellectual activity. Oden has published extensively in this field and in related areas over the last three decades.

Dr. Oden is a member of the U.S. National Academy of Engineering, a Fellow of the American Academy of Arts and Sciences, and an Honorary Member of the American Society of Mechanical Engineers. He is a Fellow of seven international scientific/technical societies: IACM, AAM, ASME, ASCE, SES, SIAM, and BMIA. He is a Fellow, founding member, and first President of the U.S. Association for Computational Mechanics and a Fellow, founding member, and past President of the International Association for Computational Mechanics. He is a Fellow and past President of both the American Academy of Mechanics and the Society of Engineering Science. Among the numerous awards he has received for his work, Dr. Oden was awarded the A. C. Eringen Medal, the Worcester Reed Warner Medal, the Lohmann Medal, the Theodore von Karman Medal, the John von Neumann medal, the Newton/Gauss Congress Medal, and the Stephan P. Timoshenko Medal. He was also knighted as "Chevalier des Palmes Academiques" by the French government and he holds five honorary doctorates, Honoris Causa, from

universities in Portugal (Technical University of Lisbon), Belgium (Faculte Polytechnique), Poland (Cracow University of Technology), the United States (Presidential Citation, The University of Texas at Austin), and France (Ecole Normale Superieure Cachan (ENSC).

In 2004, Dr. Oden was among the seven UT-Austin engineering faculty listed as the most highly cited researchers in the world from 1981-1999 in refereed, peer-reviewed journals, according to the International Scientific Index. In 2009, Oden was elected as a Fellow of the Society for Industrial and Applied Mathematics (SIAM) and received both the SIAM Distinguished Service Award and the University Cooperative Society's Career Research Excellence Award. In 2011, Oden received the prestigious SIAM/ACM Prize in Computational Science and Engineering (CS&E Prize) for his outstanding research contributions to the development and use of mathematical and computational tools and methods for the solution of science and engineering problems. In 2012, the U.S. Association for Computational Mechanics established the J. Tinsley Oden Medal to recognize "outstanding and sustained contribution to computational science, engineering, and mathematics." Most recently, Oden was honored in Japan as the 2013 Laureate for The Honda Foundation Prize for his role in establishing the field of computational mechanics.

Dr. Oden serves as a member of the Predictive Engineering Science Panel (PESP) for Sandia National Laboratories and as a Member of the IUTAM Working Party 5 on Computational Mechanics. He serves on numerous organizational, scientific and advisory committees for international conferences and symposiums. He is an Editor of Computer Methods in Applied Mechanics and Engineering and serves on the editorial board of 27 scientific journals.

Current Research Topics

Dr. Oden has worked extensively on the mathematical theory and implementation of numerical methods applied to problems in solid and fluid mechanics and, particularly, nonlinear continuum mechanics. His current research focuses on the subject of multiscale modeling and on new theories and methods his group has developed for what they refer to as "adaptive modeling." The core of any computer simulation is the mathematical model used to study the physical system of interest. They have developed methods that estimate modeling error and adapt the choices of models to control error. This has proven to be a powerful approach for multiscale problems. Applications include semiconductors manufacturing at the nanoscale level. Dr. Oden, along with ICES researchers, is also working on adaptive control methods in laser treatment of cancer, particularly prostate cancer. This work involves the use of dynamic-data-driven systems to predict and control the outcome of laser treatments using our adaptive modeling strategies. His most recent work focuses on predictive science involving the use of Bayesian statistics to validate multiscale models of atomistic and molecular systems.

Contact

Email: oden@ices.utexas.edu
Phone: 512-471-3312
Office: POB 4.102
Homepage: https://www.ices.utexas.edu/sites/oden/

Department of Petroleum and Geosystems Engineering

THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Standard Resume

FULL NAME: John T. Foster **TITLE:** Assistant Professor

DEPARTMENT: Petroleum and Geosystems Engineering
Aerospace Engineering and Engineering Mechanics (by courtesy)

EDUCATION

Purdue University	Aeronautics & Astronautics	PhD	December 2009
Texas Tech University	Mechanical Engineering	MS	December 2004
Texas Tech University	Mechanical Engineering	BS	December 2002

PROFESSIONAL REGISTRATION

Professional Engineer, Texas, #118233

CURRENT AND PREVIOUS ACADEMIC POSITIONS

The University of Texas at Austin	Assistant Professor	August 2014 – Present
The University of Texas at San Antonio	Assistant Professor	August 2011 – August 2014
The University of New Mexico	Adjunct Professor	September 2010 – May 2011

OTHER PROFESSIONAL EXPERIENCE

Sandia National Laboratories	Senior Member of the Technical Staff	January 2006 – August 2011
Sandia National Laboratories	Member of the Technical Staff	August 2004 – January 2006

CONSULTING

Curl, Stahl, Geis	Engineering analysis / expert witness	November 2014 – February 2015

AWARDS & HONORS

2015 SPE Petroleum Engineering Innovative Teaching Award

2013 Air Force Office of Scientific Research Young Investigator Award

2013 '40 Under 40' - San Antonio Business Journal

REFEREED JOURNAL ARTICLES

†*Underlined name indicates student or postdoctoral co-authors under primary supervision*

Published

1. **J.T. Foster**, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling Loose Joints in Elastic Structures–Experimental Results and Validation. *Journal of Vibration and Control*, 15(4):549–565, 2009. doi:10.1177/1077546307082908.

2. **J.T. Foster**, S.A. Silling, and W.W. Chen. Viscoplasticity using peridynamics. *International Journal for Numerical Methods in Engineering*, 81(10):1242–1258, 2010. doi:10.1002/nme.2725.

3. **J.T. Foster**, W. Chen, and V.K. Luk. Dynamic crack initiation toughness of 4340 steel at constant loading rates. *Engineering Fracture Mechanics*, 78(6):1264 – 1276, 2011. doi:10.1016/j.engfracmech.2011.02.019.

In rank of Assistant Professor at UTSA

4. **J.T. Foster**, S.A. Silling, and W. Chen. An energy based failure criterion for use with peridynamic states. *International Journal of Multiscale Computational Engineering*, 9(6):675–688, 2011. doi:10.1615/IntJMultCompEng.2011002407.

5. **J.T. Foster**, D.J. Frew, M.J. Forrestal, E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. *International Journal of Impact Engineering*, 46:56–61, August 2012. doi:10.1016/j.ijimpeng.2012.02.006.

6. **J.T. Foster**. Comments on the validity of test conditions in Kolsky bar experiments of elastic-brittle materials. *Experimental Mechanics*, 52(9):1559–1563, Brief Technical Note 2012. doi:10.1007/s11340-012-9592-6.

7. R. Rahman, **J.T. Foster**, and A. Haque. Molecular dynamics simulation and characterization of graphene-cellulose nanocomposites. *The Journal of Physical Chemistry A*, 117(25):5344–5353, 2013. doi:10.1021/jp402814t.

8. E.E. Nishida, **J.T. Foster**, and P.E. Briseno. Constant-strain-rate testing of a G10 laminate composite through optimized Kolsky bar pulse shaping techniques. *Journal of Composite Materials*, 47(23):2895–2903, 2013. doi:10.1177/0021998312460263.

9. A. Katiyar, **J.T. Foster**, H. Ouchi, and M.M. Sharma. A peridynamic formulation of pressure driven convective fluid transport in porous media. *Journal of Computational Physics*, 261:209–229, March 2014. doi:10.1016/j.jcp.2013.12.039.

10. R. Rahman and **J.T. Foster**. Deformation mechanism of graphene in amorphous polyethylene: A molecular dynamics based study. *Computational Material Science*, 87:232–240, May 2014. doi:10.1016/j.commatsci.2014.02.023.

11. R. Rahman, **J.T. Foster**, and A. Haque. A multiscale modeling scheme based on peridynamic theory. *International Journal of Multiscale Computational Engineering*, 12(3):223–248, 2014. doi:10.1615/IntJMultCompEng.2014007954.

12. R. Rahman and **J.T. Foster**. Bridging the length scales through nonlocal hierarchical multiscale modeling scheme. *Computational Material Science*, 92:401–415, September 2014. doi:10.1016/j.commatsci.2014.05.052.

13. M.D. Brothers, **J.T. Foster**, and H.R. Millwater. A comparison of different methods for calculating tangent-stiffness matrices in a massively parallel computational peridynamics code. *Computer Methods in Applied Mechanics and Engineering*, 279:247—267, September 2014. doi:10.1016/j.cma.2014.06.034.

14. M. Bessa, **J.T. Foster**, T. Belytschko, and W.K. Liu. A meshfree unification: Reproducing kernel peridynamics. *Computational Mechanics*, 53(6):1251–1264, 2014. doi:10.1007/s00466-013-0969-x.

15. J.T. O'Grady and **J.T. Foster**. Peridynamic beams: A non-ordinary state-based model. *International Journal of Solids and Structures*, 51(18):3177–3183, 2014. doi:10.1016/j.ijsolstr.2014.05.014.

In rank of Assistant Professor at UT-Austin

16. J.T. O'Grady and **J.T. Foster**. Peridynamic plates and flat shells: A non-ordinary state-based model. *International Journal of Solids and Structures*, 51(25–26):4572–4579, 2014. doi:10.1016/j.ijsolstr.2014.09.003.

17. H. Ouchi, A. Katiyar, J.R. York, **J.T. Foster**, and M.M. Sharma. A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach. *Computational Mechanics*, 55(3):561–576, March 2015. doi:10.1007/s00466-015-1123-8.

18. R. Rahman and **J.T. Foster**. A molecular dynamics based investigation of thermally vibrating graphene under different boundary conditions. *Physica E: Low-dimensional Systems and Nanostructures*, 72:25–47, August 2015. doi:10.1016/j.physe.2015.04.007.

19. R. Rahman and **J.T. Foster**. Peridynamic theory of solids from the perspective of classical statistical mechanics. *Physica-A*, 437:162–183, November 2015. doi:10.1016/j.physa.2015.05.099.

20. R. Rahman and **J.T. Foster**. Onto resolving spurious wave reflection problem with changing nonlocality among various length scales. *Communications in Nonlinear Science and Numerical Simulation*, 34:86–122, 2016. doi:10.1016/j.cnsns.2015.10.003.

21. **J.T. Foster**. A variationally consistent approach to constrained motion. *ASME. J. Appl. Mech.*, 83(5), May 2016. doi:10.1115/1.4032856.

22. J.T. O'Grady and **J.T. Foster**. A meshfree method for bending and failure in non-ordinary peridynamic shells. *Computational Mechanics*, 57(6):921–929, June 2016. doi:10.1007/s00466-016-1269-z.

BOOKS EDITED

In press

1. F. Bobaru, **J.T. Foster**, P. Guebelle, and S.A. Silling, editors. *The Handbook of Peridynamics*. Chapman and Hall/CRC, Publication date: November 11, 2016

BOOK CHAPTERS

In press

1. **J.T. Foster**. *The Handbook of Peridynamics*, chapter Constitutive Modeling in Peridynamics. Chapman and Hall/CRC, Publication date: November 11, 2016

CONFERENCE PROCEEDINGS

1. **J.T. Foster**, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling and Experimental Verification of Frictional Contact-Impact in Loose Bolted Joint Elastic Structures. In *Proceedings of IDETC'05*, number DETC2005-85465. IDETC, 2005.

2. J.G. Averett, J.D. Cargile, **J.T. Foster**, and V.K. Luk. Projectile Deceleration Due to Perforation Through Layers of Unreinforced Concrete Targets. In *Limited Proceedings of 76th Shock and Vibration Conference*, number U-045. SAVIAC, 2006.

3. J.G. Averett, J.D. Cargile, **J.T. Foster**, and V.K. Luk. Oblique Perforation of Unreinforced Concrete Targets: Experiments and Numerical Simulations. In *Limited Proceedings of 77th Shock and Vibration Conference*, 2007.

4. D.A. Dederman, D. Burnett, **J.T. Foster**, and J.A. Dykes. In Situ Penetration Testing of Darts with 16-Inch Mobile Gas Gun. In *Proceedings of 24th International Symposium on Ballistics*, number TB149, 2008.

5. **J.T. Foster**, V.K. Luk, and W. Chen. Dynamic initiation fracture toughness of high strength steel alloys. In *Proceedings of the XIth International Congress and Exposition. Orlando, Florida Society for Experimental Mechanics Inc*, volume 77, 2008.

6. **J.T. Foster**, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In *SEM 2009 Conference on Experimental and Applied Mechanics*, number 33. SEM, 2009.

7. **J.T. Foster**, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In *DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading*, volume 2, pages 1529–1535, 2009. doi:10.1051/dymat/2009216.

8. **J.T. Foster**, W. Chen, and V.K. Luk. Dynamic fracture initiation toughness of high strength steel alloys. In *DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading*, volume 1, pages 407–412, 2009. doi:10.1051/dymat/2009058.

9. **J.T. Foster**, D.J. Frew, M.J. Forrestal. E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. *Experimental and Applied Mechanics, Volume 6*, pages 229–237, 2011. doi:10.1007/978-1-4614-0222-0_29.

In rank of Assistant Professor at UTSA

10. **J.T. Foster** and E.E. Nishida. *A priori* pulse shaper design for constant-strain-rate tests of elastic-brittle materials. In V. Chalivendra, B. Song, and D. Casem, editors, *Dynamic Behavior of Materials, Volume 1*, Conference Proceedings of the Society for Experimental Mechanics Series, pages 379–386. Springer New York, 2013. doi:10.1007/978-1-4614-4238-7_49.

11. J.R. York, **J.T. Foster**, E.E. Nishida, and B. Song. A novel torsional Kolksy bar for constant-strain-rate materials testing. In B. Song, D. Casem, and J. Kimberly, editors, *Dynamic Behavior of Materials, Volume 1*, Conference Proceedings of the Society for Experimental Mechanics Series. Springer New York, 2013. doi:10.1007/978-3-319-00771-7_36.

Department of Petroleum and Geosystems Engineering

In rank of Assistant Professor at UT-Austin

12. J.T. O'Grady and **J.T. Foster**. Peridynamic beams and plates: A non-ordinary state-based model. In *ASME 2014 International Mechanical Engineering Congress and Exposition*, number IMECE2014-39887, 2014. doi:10.1115/IMECE2014-39887.

13. H. Ouchi, A. Katiyar, **J.T. Foster**, and M.M. Sharma. A Peridynamics Model for the Propagation of Hydraulic Fractures in Heterogeneous, Naturally Fractured Reservoirs. In *SPE Hydraulic Fracturing Technology Conference*, number SPE-173361-MS. Society of Petroleum Engineers, February 2015. doi:10.2118/173361-MS.

14. E.A. Lynd, **J.T. Foster**, and Q.P. Nguyen. An application of the Isogeometric Analysis Method to reservoir simulation. In *78th EAGE Conference and Exhibition*, number SPE-180110-MS. Society of Petroleum Engineers, 2016. doi:10.2118/180110-MS.

TECHNICAL REPORTS

1. **J.T. Foster**. Scale Modeling of Earth Penetrators for In Situ Targets. Technical Report SAND2006-4273, Sandia National Laboratories, 2006.

2. J.A. Dykes and **J.T. Foster**. Discrete-ULL 1-C Final Test Report. Technical Report SAND2007-4273, Sandia National Laboratories, 2007.

3. **J.T. Foster** and A.J. Webb. Penetration Simulations for Angle-of-Attack (AoA) Experiments into Low Strength Concrete Targets. SAND2007-5256, Sandia National Laboratories, 2007.

4. R.J. Fogler, J.W. Giron, J.A. Jacob, W.P. Wolfe, R.W. Greene, R.D. Tucker, A.E. Fortier, **J.T. Foster**, D.M. Van Zuiden, W.T. O'Rourke, H.D. Nguyen, E. Ollila, and J.R. Phelan. Guided miniature air-deliverable sensor dart. Technical Report SAND2007-6528, Sandia National Laboratories, 2007.

5. P.D. Coleman, R.A. Bates, M.T. Buttram, S.B. Dron, **J.T. Foster**, R.J. Franco, C.O. Landron, G.M. Loubriel, J.E. Lucero, A. Mar, T.L. Martinez, F.E. Reyes, and B.J. Welch. Void Sensor for Penetrators. Technical Report SAND2007-6528, Sandia National Laboratories, 2007.

6. **J.T. Foster**, A.J. Webb, A.E. Fortier, V.K. Luk, and D.A. Dederman. Penetration Code Study for Angle-of-Obliquity (AoO) Experiments into High-Strength Concrete Targets. Technical Report SAND2008-1162, Sandia National Laboratories, 2008.

7. **J.T. Foster**, A.E. Fortier, J.G. Averett, J.D. Cargile, V.K. Luk, and D.A. Dederman. Predictive Simulation for Perforation Through Layers of Unreinforced Concrete Targets. Technical Report SAND2008-113, Sandia National Laboratories, 2008.

8. E.E. Nishida, **J.T. Foster**, E.W. Klamerus, and D. Burnett. Dynamic behavior of shock isolation/ mitigation materials by kolsky bar experiments. Technical Report SAND2011-8266, Sandia National Laboratories, 2011.

9. J.V. Cox, G.W. Wellman, J.M. Emery, J.T. Ostien, **J.T. Foster**, T.E. Cordova, T.B. Crenshaw, A. Mota, J.E. Bishop, S.A. Silling, D.J. Littlewood, J.W. Foulk III, K.J. Dowding, K. Dion, B.L. Boyce, J.H. Robbins, and B.W. Spencer. Ductile Failure X-prize. Technical Report SAND2011-6801, Sandia National Laboratories, 2012. doi:10.2172/1029764.

In rank of Assistant Professor at UT-Austin

10. Peridynamics Capabilities Review Panel. Peridynamics capabilities review panel report. SAND Report 2015-1921, Sandia National Laboratories, Albuquerque, NM and Livermore, CA, 2015.

TECHNICAL PRESENTATIONS

Invited Talks

1. "Peridynamic modeling of viscoplasticity and dynamic fracture." University of New Mexico, Mechanical Engineering. February 2010.

2. "Peridynamic modeling of viscoplasticity and dynamic fracture." University of Nebraska, Engineering Mechanics. April 2010.

In rank of Assistant Professor at UTSA

3. "Unifying the mechanics of continuous and discontinuous media." 2011 International Workshop on Intensive Loading and its Effects. State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology. Beijing, China. December 2011.

4. "Hydraulic fracturing and its environmental impact: a short address of major public concerns." Presentation for the Center for Simulation, Visualization, and Real-Time Prediction participation in UTSA Earthweek 2012. April 2012.

5. "Unifying the mechanics of continuous and discontinuous media." Texas Tech University, Mechanical Engineering. April 2012.

6. "Unifying the mechanics of continuous and discontinuous media." The Johns Hopkins University, Center for Advanced Ceramics and Metallic Systems. July 2012.

7. "Unifying the mechanics of continuous and discontinuous media." Army Research Laboratory. February 2013.

8. "Peridynamics as a unified theory for heterogenous media, anomalous porous flow, and fracture." The University of Texas at Austin, Department of Petroleum & Geosystems Engineering. October 2013.

9. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." Northwestern University, Department of Mechanical Engineering. January 2014.

10. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." The University of Texas at Austin, Department of Petroleum & Geosystems Engineering. March 2014.

11. "A model for nonlocal diffusion and fluid-driven fracture." USACM/IUTAM Symposium on Connecting Multiscale Mechanics to Complex Material Design. Northwestern University. May 2014.

12. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." ExxonMobil - Corporate Strategic Research. July 2014.

Department of Petroleum and Geosystems Engineering

In rank of Assistant Professor at UT-Austin

13. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." Center for Mechanics of Solids, Structures and Materials, The University of Texas at Austin, Department of Aerospace Engineering and Engineering Mechanics. September 2014.

14. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." University of Illinos – Urbana-Champaign, Department of Aerospace Engineering. September 2014.

15. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." Institute for Computational Engineering Science, The University of Texas at Austin. October 2014.

16. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." Graduate Aerospace Laboratories, California Institute of Technology. January 2015.

17. "Nonlocal multiphysics for heterogeneous materials, anomalous diffusion, and fracture." Total. March 2015.

18. "A multiphysics model for hydraulic fracture simulation." Eighth International Workshop Meshfree Methods for Partial Differential Equations. Universität Bonn. September 2015.

19. "Isogeometric peridynamics." USACM Thematic Workshop on Nonlocal Models in Mathematics, Computation, Science, and Engineering. Oak Ridge National Laboratory. October 2015.

20. "Nonlocal models for anamalous transport" Schlumberger EUREKA Fluid Mecahnics Mini-Workshop. Schlumberger-Doll Research Center. July 2016.

Conferences

1. "Viscoplasticity using peridynamics." (with S.A. Silling and W. Chen) 10th US National Congress on Computational Mechanics. July 2009.

In rank of Assistant Professor at UTSA

2. "Peridynamic Modeling of Localization in Ductile Metals." (with D.J. Littewood and B.L. Boyce) International Workshop on Computational Mechanics of Materials IWCMM XXII. September 2012.

3. "Implicit time integration of an ordinary state-based peridynamic plasticity model with isotropic hardening." (with D.J. Littlewood, J.A. Mitchell, M.L. Parks). SiViRT Simulation and Vizualization Symposium. November 2012.

4. "Implicit time integration of an ordinary state-based peridynamic plasticity model with isotropic hardening." (with D.J. Littlewood, J.A. Mitchell, M.L. Parks). ASME IMECE 2012. November 2012.

5. "A Peridynamics Formulation of the Coupled Mechanics-Fluid Flow Problem". (with A. Katiyar, H. Ouchi, M.M. Sharma). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

6. "Lessons Learned in Modeling Ductile Failure with Peridynamics". (with D.J. Littlewood). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

7. "A Peridynamics Based Hierarchical Multiscale Modeling Framework Between Continuum and Atomistic Scales". (with R. Rahman, A. Haque). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

8. "Two-Dimensional Semi-Analytic Solutions to the Linearized State-Based Peridynamic Equilibrium Equation". (with J.T. O'Grady). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

9. "A novel hierarchical multiscale modeling framework for polyethylene systems using Peridynamics and molecular dynamics". (with R. Rahman). 2013 Mach Conference, Annapolis, MD. April 2013.

10. "A non-local formulation for fluid flow and mass transport in porous media based on peridynamic theory". (with A. Katiyar and M. Sharma). 12th US National Congress on Computational Mechanics. July 2013.

11. "Regularizing numerical simulations of strain-localization using a peridynamics-based plasticity formulation". (with Md.I. Kahn, D.J. Littlewood, and J.A. Mitchell). International Workshop on Computational Mechanics of Materials, IWCMM XXIII. October 2013

12. "Bridging the length scales by linking the atomistic model with coarser peridynamic models through molecular dynamics simulation of Polyethylene". (with R. Rahman). Mach Conference 2014. April 2014.

13. "A nonlocal poroelastic approach to fluid driven fracture." (with J.R. York, A. Katiyar, H. Ouchi, M. Sharma). US National Congress on Theoretical and Applied Mechanics. June 2014.

14. "Reproducing Continuum Dynamics". (with M. Bessa, W.K. Liu, T. Belytschko). World Congress on Computational Mechanics 2014. July 2014.

15. "A nonlocal poroelastic approach to fluid driven fracture." (with J.R. York, A. Katiyar, H. Ouchi, M. Sharma). World Congress on Computational Mechanics XI. July 2014.

In rank of Assistant Professor at UT-Austin

16. "An Overview of the Progress of Meshfree Particle Methods: From SPH to EFG to RKPM to Meshfree Peridynamics." (with W.K. Liu, M. Bessa). Meshfree Methods for Large-Scale Computational Science and Engineering. October 2014.

17. "Fracture in plates and shells with peridynamic non-ordinary state-based models." Meshfree Methods for Large-Scale Computational Science and Engineering. October 2014.

18. "An Ordinary State Based Plasticity Model For Peridynamics." (with J.A. Mitchell). ASME 2014 International Mechanical Engineering Congress and Exposition. November 2014.

19. "Regularizing numerical simulations of shear-banding using a peridynamics-based plasticity formulation." (with Md.I.H. Kahn). ASME 2014 International Mechanical Engineering Congress and Exposition. November 2014.

20. "Mesoscale Simulations Investigating the Effects of Shock Wave Stability in Granular Materials with Peridynamics." (with R. Rahman, A. Peterson, T. Vogler). 13th US National Congress on Computational Mechanics. July 2015.

21. "Bending Failure in Peridynamic Plates." (with J. O'Grady). ASME 2015 International Mechanical Engineering Congress and Exposition. November 2015.

22. "A peridynamic model for hydraulic fracture." (with H. Ouchi, J.R. York, M.M. Sharma). Engineering Mechanics Institute Conference 2016. May 2016.

23. "A peridynamic model for hydraulic fracture." (with H. Ouchi, J.R. York, M.D. Brothers, M.M. Sharma). SIAM Annual Conference. July 2016.

24. "A model for the transport of miscible fluids in the presence of anomalous diffusion." (Keynote, with R. Tabasi). World Congress on Computational Mechanics XII. July 2016.

25. "A variationally consistent approach to constrained motion." 24th International Congress on Theoretical and Applied Mechanics. August 2016.

Student Delivered

1. "Intragranular fracture and frictional effects in granular materials under pressure-shear loading." (with A.M. Peterson and T.J. Vogler) 18th Biennial Intl. Conference of the APS Topical Group on Shock Compression of Condensed Matter held in conjunction with the 24th Biennial Intl. Conference of the Intl. Association for the Advancement of High Pressure Science and Technology (AIRAPT). July 2013.

2. "A complex-step method for tangent-stiffness calculation in a massively parallel computational peridynamics code." (with M.D. Brothers and H.R. Millwater). 12th US National Congress on Computational Mechanics. July 2013.

3. "A peridynamic model of diffusive fluid flow through a deformable media." (with J.R. York). 2013 SACNAS National Conference. October 2013.

4. "The Next Generation Model for Predicting the Growth of Complex Fracture Networks." (with J.R. York). 2014 Hydraulic Fracturing and Sand Control Joint Industry Program Technical Review. April 2014.

5. "Peridynamic beams, plates, and shells: a non-ordinary state-based model." (with J. O'Grady). Society of Engineering Science 2014. October 2014.

6. "Peridynamic beams, plates, and shells: a non-ordinary state-based model." (with J. O'Grady). ASME 2014 International Mechanical Engineering Congress and Exposition. November 2014.

7. "A Peridynamic Model for Hydraulic Fracture." (with H. Ouichi, A. Katiyar, M. Sharma). 13th US National Congress on Computational Mechanics. July 2015.

8. "Mesh-Free Non-ordinary Peridynamic Bending." (with J. O'Grady). 13th US National Congress on Computational Mechanics. July 2015.

9. "Modeling of Contact and Non-Local Friction in a Peridynamic Framework." (with J.R. York). 13th US National Congress on Computational Mechanics. July 2015.

Department of Petroleum and Geosystems Engineering

Poster

1. "Intragranular fracture and frictional effects in granular materials under pressure-shear loading." (with A.M. Peterson and T.J. Vogler) 18th Biennial Intl. Conference of the APS Topical Group on Shock Compression of Condensed Matter held in conjunction with the 24th Biennial Intl. Conference of the Intl. Association for the Advancement of High Pressure Science and Technology (AIRAPT). July 2013.

2. "A Peridynamic Model for Hydraulic Fracture." (with J.R. York) USACM Thematic Workshop on Nonlocal Models in Mathematics, Computation, Science, and Engineering. Oak Ridge National Laboratory. October 2015.

SOFTWARE

Core developer for *Peridigm* open source peridynamics software

Website: http://peridigm.sandia.gov

Source Code: http://github.com/peridigm/peridigm

Various other projects developed and contributed to

Source Codes: http://github.com/johntfoster

BLOG

Contains various useful code snippets, examples, and resources primarly targeted to assist in students working under my supervision and other researchers in scientific computation.

Website: http://johntfoster.github.io/

GRANT PROPOSALS

Externally Funded – ***PI Total: $2.4M, co-PI Total: $10.3M***

In rank of Assistant Professor at UTSA

1. Sandia X-Prize Necking Challenge. Sandia National Laboratories, 2012. *PI* $44,700.

2. Peridynamic Simulation of Granular Materials Undergoing Shock Compression. Sandia National Laboratories, 2012. *PI* $32,597

3. Statistical coarse-graining of molecular dynamics into peridynamics. *Subaward* from Army Reasearch Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2012. *PI* $91,925.

4. Fracture Design, Placement And Sequencing In Horizontal Wells. National Energy Technology Laboratory 2012-2016, DE-FOA-0000724 *co-PI w/ M. Sharma (UT-Austin)* Total Award: $1,592,451, Foster Award: $275,250.

5. Peridynamic simulation of pressure-shear experiments on granular media. Sandia National Laboratories, 2013. *PI* $29,071

6. Towards a multiscale failure modeling paradigm for polymers: statistical coarse-graining of molecular dynamics into peridynamics. *Subaward* from Army Reasearch Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2013. *PI* $91,925.

7. Predictive simulation of material failure using peridynamics-advanced constitutive modeling, verification, and validation. Air Force FY2013 Young Investigator Program. BAA-AFOSR-2012-0001, AFOSR, 2013-2015. *PI* $360,000.

8. MURI Center for Material Failure Prediction Through Peridynamics. Air Force Office of Scientific Research, 2013-2018. ONRBAA12-020, *co-PI w/ E. Madenci (Arizona), F. Bobaru (Nebraska), N. Chawla (Arizona State), Q. Du (Columbia)* Total Award $7,500,000. Foster Award: $959,153.

9. Fiber failure modeling with peridynamics. *Subaward* from Army Reasearch Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2014. *PI* $101,306.

In rank of Assistant Professor at UT-Austin

10. Nonlocal and fractional order methods for near-wall turbulence, large-eddy simulation, and fluid–structure interaction. Army Research Office, 2015-2018. ONRFOA14-012, *PI* $345,000.

11. Pulse Fracture Simulation. GE Global Research, 2016. *PI* $100,000.

Internally Funded

1. Application of Peridynamics to Hydraulic Fracture Modeling. The University of Texas at San Antonio – Office of the Vice President for Research, 2012. *PI* $18,927.

Pending

1. CAREER: A nonlocal approach to fluid driven fracture with applications in energy production and environmental assessment. National Science Foundation, 2016-2020. Requested $500,000.

COURSES TAUGHT

PGE 334 - Reservoir Geomechanics (UT S2015)

PGE 383 - Advanced Geomechanics (UT F2014, F2015)

PGE 323M - Reservoir Engineering III (UT F2015)

Introduction to High-Performance Computing (UTSA F2012, F2013, S2014)

ME 6043 – Continuum Mechanics (UTSA F2012, F2014)

ME 4603 – Finite Element Analysis (UTSA F2011)

ME 400/500 – Numerical Methods (UNM F2010)

ADVISING AND RELATED STUDENT SERVICES

Graduate Students (Graduated)

PhD

1. James O'Grady, Ph.D.M.E. 2014 (UTSA, now at Army Research Lab)

Department of Petroleum and Geosystems Engineering

MS

1. Amanda Peterson, M.S.M.E 2014 (UTSA)
2. Md. Imran Khan, M.S.M.E. 2014 (UTSA)
3. Michael Brothers, M.S.M.E 2013 (UTSA)
4. Jason York, M.S.M.E 2012 (UTSA)
5. Arron Werthiem, M.S.M.E 2012 (UTSA)

Graduate Students (In Progress)

PhD - Passed qualifying examination

1. Jason York (UT-PGE)
2. Mingyaun Yang (UT-PGE) *co-advised with Q.Nguyen*
3. Yu Leng (UT-PGE)

PhD

1. Michael Brothers (UT-EM)
2. Eric Lynd (UT-PGE) *co-advised with Q.Nguyen*
3. Rambod Yousefzadeh Tabasi (UT-EM)
4. Masoud Behzadinasab (UT-EM)

MS

1. Sai Uppati (UT-PGE)
2. Xiao Xu (UT-PGE)

Postdoctoral Researcher's Supervised

1. James O'Grady, Ph.D. (UT)
2. Rezwanur Rahman, Ph.D. (UTSA/UT)
3. Shamima Yasmin, Ph.D. (UTSA)

Department of Petroleum and Geosystems Engineering

Undergraduate Research Assistants

1. P. Eric Briseno, B.S.M.E. 2013
2. Robert Knobles, B.S.M.E. 2014 (Baker-Hughes)
3. Robert Brothers
4. Jason Crandall
5. Sam Petzold – Moncrief Summer Intern

Graduate Commitee Member

Hisanao Ouchi, Ph.D. PGE, Yongcun Feng, Ph.D. PGE 2016
Sarah Boukris, Ph.D. BME, Daniel Sparkman, Ph.D. M.E., 2014
Khaled Mahmud, Saurav Kumar, M.S.M.E. 2013
Miguel Cortina, Carlos Acosta, David Wagner, M.S.M.E 2012

External Commitee Member

Md. Essack, University of Cape Town, South Africa 2014

Undergraduate Research Assistants

1. P. Eric Briseno, B.S.M.E. 2013
2. Robert Knobles, B.S.M.E. 2014 (Baker-Hughes)
3. Robert Brothers
4. Jason Crandall

ACADEMIC-RELATED PROFESSIONAL AND PUBLIC SERVICE

Conferences/Workshops Organized

1. US National Congress on Computational Mechanics 15

   Conference Chair

   To be held in Austin, TX, July 28-August 1, 2019

2. Workshop on Isogeometric Analysis and Meshfree Methods

   Sponsered by the US Association for Computational Mechanics.

   To be held at UCSD, October 10-12, 2016

   http://iga-mf.usacm.org

3. Workshop on Meshfree Methods for Computational Science and Engineering

   Sponsered by the US Association for Computational Mechanics.

Held at UCF, October 27-28, 2014

http://mmlcse2014.usacm.org

4. Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal models.

   Sponsered by the US Association for Computational Mechanics.

   Held at UTSA Downtown Campus, March 11-12, 2013

   http://ndf2013.usacm.org

Mini-symposia Organized

1. Modeling of Material Failure Using Approaches Beyond Locality: A Celebration of Dr. Stewart Silling's 60^{th} Birthday, *To be held* ASME IMECE2016
2. Advances in Galerkin and Collocation Meshfree Methods, WCCM 2016.
3. Corrosion Damage and Stress Corrosion Cracking: Experiments, Modeling, and Computations, ASME IMECE2015
4. Advances in nonlocal/peridynamic modeling: Symposia in honor of Dr. Stewart Silling's 55^{th} birthday, ASME IMECE2012.
5. Multiscale methods and nonlocal theories for complex material behavior. USACM USNCCM12.
6. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2014.
7. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2013.
8. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2012.

ADMINISTRATIVE AND COMMITTEE SERVICE

Committee Assignments

Department

PGE Undergraduate Studies 2015-2016

PGE Graduate Admissions Committee 2015-2016

PGE Department Awards Committee 2014-2016

Graduate Committee 2013-2014 (UTSA)

Faculty Search Committee 2013-2014 (UTSA)

Department Promotional Activities 2012-2013 (UTSA)

Seminar 2011-2012 (UTSA)

University

Cockrell School Engineering Honors 2015-2016

Undergraduate Research Day Planning Committee 2013-2014 (UTSA)

Department of Petroleum and Geosystems Engineering

Student Organization Advisor

Programming for Engineers & Scientists 2016

Tau Beta Pi 2013-2014 (UTSA)

Formula SAE Car Team 2013-2014 (UTSA)

REVIEWER FOR

Journals

Computational Geosciences, Journal of Applied Mechanics, Computational Methods in Applied Mechanics and Engineering, Journal of Computational Particle Mechanics, Journal of Microelectromechanical Systems, Computational Mechanics, Int. Journal of Fracture, Applied Mathematics & Computation, Int. Journal of Impact Engineering, Engineering Fracture Mechanics, Experimental Mechanics, Review of Scientific Instruments, Int. Journal of Multiscale Computational Engineering, Int. Journal of Solids and Structures, CMC: Computers, Materials, & Continua, Journal of Mechanics of Materials and Structures.

Books

Split Hopkinson (Kolsky) Bar. W. Chen and B. Song. Springer 2010.

Book Proposals

CRC Press

ORGANIZATIONS

Society of Petroleum Engineers, US Association for Computational Mechanics, Pi Tau Sigma - Mechanical Engineering Honor Fraternity, Tau Beta Pi - National Engineering Honor Society, American Society of Mechanical Engineers, American Institute of Aeronautics and Astronautics, Society for Experimental Mechanics – Dynamic Behavior of Materials Technical Division Committee Member, DYMAT, American Society for Engineering Education

VITA

John T. Foster is an assistant professor in the Departments of Petroleum and Geosystems Engineering and Aerospace Engineering and Engineering Mechanics (by courtesy) at the University of Texas at Austin. He received his BS and MS in mechanical engineering from Texas Tech University and PhD from Purdue University. He is a registered Professional Engineer in the State of Texas. During his career in research he has been involved in many projects ranging from full scale projectile penetration field tests, to laboratory experiments using Kolsky bars, to modeling and simulation efforts using some of the world's largest computers. His research interests are in experimental and computational mechanics and multi-scale modeling with applications to geomechanics, impact mechanics, fracture mechanics, and anamolous transport processes. Additionally, he has interest in fundamental theoretical advancement of the peridynamic theory of solid mechanics. His teaching interests are in all areas of theoretical and computational mechanics.

Last updated: 2016/09/12 at 18:22:59

Statistical Summary for "In Rank"
John T. Foster, Ph.D., P.E.

Metric	Value
Peer-reviewed journal publications (in rank ***and total)***	19 / 22
Peer-reviewed conference proceedings (in rank ***and total)***	5 / 14
Number of ***journal*** papers ***in rank*** with UT (UTSA) students ***as co-authors***	3 (4)
Total citations of all publications (career) ***from ISI Web of Knowledge***	124
h-index (career) ***from ISI Web of Knowledge****	7
Total citations of all publications (career) ***from Google Scholar***	261
h-index (career) ***from Google Scholar***	9
Total external research funding raised	$10.29M
Total external research funding raised (candidate's share)	$2.4M
Total number of external grants/contracts ***awarded***	11
Number of external grants/contracts ***awarded*** as PI	9
PhD students completed†	1 (1)
MS students completed†	5 (5)
PhD students in pipeline (as of 09/2016) †	6 (5)
MS students in pipeline (as of 09/2016) †	2 (2)
Number of courses taught	6
Total # of students taught in organized courses	363
Average instructor evaluation for UG courses	3.9
Average instructor evaluation for Grad courses	4.5
Average course evaluation for UG courses	3.8
Average course evaluation for Grad courses	4.3
Teaching awards	1
Student organizations advised	3
Undergraduate ***researchers*** supervised	5
Service on journal editorial boards	0
Number of symposia organized	10

****Provide a printout/screen shot of the first page of the report from both ISI Web of Knowledge and Google Scholar***

† Count a student as 1.0 if sole supervisor and 0.5 if co-supervised.

Complete reverse chronological list of publications and scholarly/creative works
John T. Foster, Ph.D, P.E.

Title of Dissertation: Dynamic Fracture Initiation Toughness: Experiments and Peridynamic Modeling
Dissertation Advisor: Weinong Chen, Purdue University

Section 1. Works published (or in an equivalent status), in press, accepted, or under contract while in current rank at UT Austin.

Journal Articles

J.T. O'Grady and J.T. Foster. A meshfree method for bending and failure in non-ordinary peridynamic shells. Computational Mechanics, 57(6):921–929, June 2016. doi:10.1007/s00466-016-1269-z.

- Co-authors: James O'Grady, PhD student at UTSA when work was performed, postdoctoral researcher at UT-Austin when paper was submitted.
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. The first author led the writing and research while I provided supervision as his PhD advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

J.T. Foster. A variationally consistent approach to constrained motion. ASME. J. Appl. Mech., 83(5), May 2016. doi:10.1115/1.4032856.

R. Rahman and J.T. Foster. Onto resolving spurious wave reflection problem with changing nonlocality among various length scales. Communications in Nonlinear Science and Numerical Simulation, 34:86–122, 2016. doi:10.1016/j.cnsns.2015.10. 003.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UT-Austin
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. The first author led the writing and research while I provided supervision as his postdoctoral advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

R. Rahman and J.T. Foster. Peridynamic theory of solids from the perspective of classical statistical mechanics. Physica-A, 437:162–183, November 2015. doi: 10.1016/j.physa.2015.05.099.
R. Rahman and J.T. Foster. A molecular dynamics based investigation of thermally vibrating graphene under different boundary conditions. Physica E: Low-dimensional Systems and Nanostructures, 72:25–47, August 2015. doi:10.1016/j.physe.2015. 04.007.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UT-Austin
- Qualitative statement of contribution: I designed the research along with the first author. The first author led the writing and research while I provided supervision as his postdoctoral advisor. I edited the paper before submission and wrote reviewer rebuttal statements.

R. Rahman and J.T. Foster. A molecular dynamics based investigation of thermally vibrating graphene under different boundary conditions. Physica E: Low-dimensional Systems and Nanostructures, 72:25–47, August 2015. doi:10.1016/j.physe.2015. 04.007.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UT-Austin
- Qualitative statement of contribution: I designed the research along with the first author. The first author led the writing and research while I provided supervision as his postdoctoral advisor. I edited the paper before submission and wrote reviewer rebuttal statements.

H. Ouchi, A. Katiyar, J.R. York, J.T. Foster, and M.M. Sharma. A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach. Computational Mechanics, 55(3):561–576, March 2015. doi:10.1007/s00466-015- 1123-8.

- Co-authors: Hisanao Ouchi, PhD student at UT-Austin, Amit Katiyar, postdoctoral researcher at UT-Austin, Jason York, PhD student at UT-Austin, Mukul Sharma, professor at UT-Austin
- Qualitative statement of contribution: I designed the research and was the co-PI on the project that funded the work along with the last author. I worked on the theoretical developments in the paper with the first 3 authors. I edited the paper before submission and wrote reviewer rebuttal statements.

J.T. O'Grady and J.T. Foster. Peridynamic plates and flat shells: A non-ordinary state-based model. International Journal of Solids and Structures, 51(25–26):4572–4579, 2014. doi:10.1016/j.ijsolstr.2014.09.003.

- Co-authors: James O'Grady, PhD student at UTSA when work was performed, postdoctoral researcher at UT-Austin when paper was under revision and accepted.
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. I drafted the paper along with the first author while I provided supervision as his PhD advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

Conference Proceedings

E.A. Lynd, J.T. Foster, and Q.P. Nguyen. An application of the Isogeometric Analysis Method to reservoir simulation. In 78th EAGE Conference and Exhibition, number SPE-180110-MS. Society of Petroleum Engineers, 2016. doi:10.2118/180110-MS.

- Co-authors: Eric Lynd, MS/PhD student at UT-Austin, Quoc Nguyen, associate professor of PGE at UT-Austin.
- Qualitative statement of contribution: I designed the research along with the third author. I drafted the paper along with the first author while I provided supervision as his PhD co-advisor. I edited the paper before submission.

H. Ouchi, A. Katiyar, J.T. Foster, and M.M. Sharma. A Peridynamics Model for the Propagation of Hydraulic Fractures in Heterogeneous, Naturally Fractured Reservoirs. In SPE Hydraulic Fracturing Technology Conference, number SPE-173361-MS. Society of Petroleum Engineers, February 2015. doi:10.2118/173361-MS.

- Co-authors: Hisanao Ouchi, PhD student at UT-Austin, Amit Katiyar, postdcotural researcher at UT-Austin. Mukul Sharma professor of PGE at UT-Austin.
- Qualitative statement of contribution: I designed the research and am co-PI on the project that funded the work along with the last author. I worked on the theoretical developments in the paper with the first 3 authors. I edited the paper before submission.

J.T. O'Grady and J.T. Foster. Peridynamic beams and plates: A non-ordinary state-based model. In ASME 2014 International Mechanical Engineering Congress and Exposition, number IMECE2014-39887, 2014. doi:10.1115/IMECE2014-39887.

- Co-authors: James O'Grady, PhD student at UTSA when work was performed
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. I drafted the paper along with the first author while I provided supervision as his PhD advisor. I edited the paper before submission.

Books Edited

F. Bobaru, J.T. Foster, P. Guebelle, and S.A. Silling, editors. Handbook of Peridynamic Modeling. Chapman and Hall/CRC, In Press.

- Co-editors: Florin Bobaru, professor at the University of Nebraska, Phillipe Guebelle, professor at University of Illinois, Stewart Silling, research scientist at Sandia National Laboratories
- Qualitative statement of contribution: I performed editing duties equally with the other editors which included inviting authors, reviewing chapters and working with the publisher to complete the book. I wrote the preamble with the first editor.

Book Chapters

J.T. Foster. Handbook of Peridynamic Modeling, chapter Constitutive Modeling in Peridynamics. Chapman and Hall/CRC, In Press.

Section 2. Works published (or in equivalent status) while in current rank at other institutions (if applicable)

Journal Papers

J.T. O'Grady and J.T. Foster. Peridynamic beams: A non-ordinary state-based model. International Journal of Solids and Structures, 51(18):3177–3183, 2014. doi: 10.1016/j.ijsolstr.2014.05.014.

- Co-authors: James O'Grady, PhD student at UTSA when work was performed
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. I drafted the paper along with the first author while I provided supervision as his PhD advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

M. Bessa, J.T. Foster, T. Belytschko, and W.K. Liu. A meshfree unification: Reproducing kernel peridynamics. Computational Mechanics, 53(6):1251–1264, 2014. doi:10.1007/s00466-013-0969-x.

- Co-authors: Miguel Bessa, PhD student at Northwestern, Ted Belytschko, Professor emeritus at Northwestern, Wing-Kam Liu, professor at Northwestern
- Qualitative statement of contribution: I designed the research with the third and fourth authors and performed the theoretical work and drafted the paper with the first author. I edited the paper before submission and wrote reviewer rebuttal statements.

M.D. Brothers, J.T. Foster, and H.R. Millwater. A comparison of different methods for calculating tangent-stiffness matrices in a massively parallel computational peridynamics code. Computer Methods in Applied Mechanics and Engineering, 279:247—267, September 2014. doi:10.1016/j.cma.2014.06.034.

- Co-authors: Michael Brothers, MS student at UTSA, Harry Millwater, professor at UTSA
- Qualitative statement of contribution: I designed the research with the third author and was the sole advisor of the first author during the work. I drafted the paper with the first author and wrote reviewer rebuttal statements.

R. Rahman and J.T. Foster. Bridging the length scales through nonlocal hierarchical multiscale modeling scheme. Computational Material Science, 92:401–415, September 2014. doi:10.1016/j.commatsci.2014.05.052.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UTSA
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. I drafted the paper with the first author and supervised the research as his postdoctoral advisor. I wrote reviewer rebuttal statements.

R. Rahman, J.T. Foster, and A. Haque. A multiscale modeling scheme based on peridynamic theory. International Journal of Multiscale Computational Engineering, 12(3):223–248, 2014. doi:10.1615/IntJMultCompEng.2014007954.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UTSA. Anwarul Haque, professor at University of Alabama
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. I drafted the paper with the first author and supervised the research as his postdoctoral advisor. I wrote reviewer rebuttal statements.

R. Rahman and J.T. Foster. Deformation mechanism of graphene in amorphous polyethylene: A molecular dynamics based study. Computational Material Science, 87:232–240, May 2014. doi:10.1016/j.commatsci.2014.02.023.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UTSA
- Qualitative statement of contribution: I designed the research and was the sole-PI on the project that funded the work. The first author led the writing while I supervised the research as his postdoctoral advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

A. Katiyar, J.T. Foster, H. Ouchi, and M.M. Sharma. A peridynamic formulation of pressure driven convective fluid transport in porous media. Journal of Computational Physics, 261:209–229, March 2014. doi:10.1016/j.jcp.2013.12.039.

- Co-authors: Hisanao Ouchi, PhD student at UT-Austin, Amit Katiyar, postdoctoral researcher at UT-Austin, Mukul Sharma, professor at UT-Austin
- Qualitative statement of contribution: I designed the research and was the co-PI on the project that funded the work along with the last author. I worked on the theoretical developments in the paper with the first authors. I drafted the paper with the first author and wrote reviewer rebuttal statements.

E.E. Nishida, J.T. Foster, and P.E. Briseno. Constant-strain-rate testing of a G10 laminate composite through optimized Kolsky bar pulse shaping techniques. Journal of Composite Materials, 47(23):2895–2903, 2013. doi:10.1177/0021998312460263.

- Co-authors: Erik Nishida, research scientist at Sandia National Laboratories, Eric Briseno, undergraduate student at UTSA
- Qualitative statement of contribution: I designed the research and supervised the experimental work performed by the first author. I developed and coded an optimization routine used in the design-of-experiments along with the third author for whom I served as undergraduate research advisor. I drafted the paper alone and wrote reviewer rebuttal statements.

R. Rahman, J.T. Foster, and A. Haque. Molecular dynamics simulation and characterization of graphene-cellulose nanocomposites. The Journal of Physical Chemistry A, 117(25):5344–5353, 2013. doi:10.1021/jp402814t.

- Co-authors: Rezwanur Rahman, postdoctoral researcher at UTSA, Anwural Haque, the University of Alabama
- Qualitative statement of contribution: I co-supervised the research with the third author. The first author led the writing while I supervised the research as his postdoctoral advisor. I heavily edited the paper before submission and wrote reviewer rebuttal statements.

J.T. Foster. Comments on the validity of test conditions in Kolsky bar experiments of elastic-brittle materials. Experimental Mechanics, 52(9):1559–1563, Brief Technical Note 2012. doi:10.1007/s11340-012-9592-6.

J.T. Foster, D.J. Frew, M.J. Forrestal, E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. International Journal of Impact Engineering, 46:56–61, August 2012. doi:10.1016/j.ijimpeng.2012.02.006.

- Co-authors: Daniel Frew, owner of Dynamic Systems and Research, Inc., Michael Forrestal, research scientist at Sandia National Laboratories (retired), Eric Nishida, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I performed and supervised experiments with the fourth author. I developed a mathematical model for the design-of-experiments and drafted the paper with the third author. I edited the paper before submission and wrote reviewer rebuttal statements.

J.T. Foster, S.A. Silling, and W. Chen. An energy based failure criterion for use with peridynamic states. International Journal of Multiscale Computational Engineering, 9(6):675–688, 2011. doi:10.1615/IntJMultCompEng.2011002407.

- Co-authors: Stewart Silling, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I developed a mathematical failure theory and implemented the computational model for validation. I drafted the paper alone and wrote reviewer rebuttal statements.

Conference Proceedings

J.R. York, J.T. Foster, E.E. Nishida, and B. Song. A novel torsional Kolksy bar for constant-strain-rate materials testing. In B. Song, D. Casem, and J. Kimberly, editors, Dynamic Behavior of Materials, Volume 1, Conference Proceedings of the Society for Experimental Mechanics Series. Springer New York, 2013. doi:10.1007/ 978-3-319-00771-7_36.

- Co-authors: Jason York, MS student at UTSA under my supervision, Eric Nishida, research scientist at Sandia National Laboratories, Bo Song, research scientist at Sandia National Laboratories
- Qualitative statement of contribution: I designed the research with the third and fourth author. I performed and supervised experiments with the second author. I developed a mathematical model for the design-of-experiments and drafted the paper with the third author. I edited the paper before submission.

J.T. Foster and E.E. Nishida. A priori pulse shaper design for constant-strain-rate tests of elastic-brittle materials. In V. Chalivendra, B. Song, and D. Casem, editors, Dynamic Behavior of Materials, Volume 1, Conference Proceedings of the Society for Experimental Mechanics Series, pages 379–386. Springer New York, 2013. doi: 10.1007/978-1-4614-4238-7_49.

- Co-authors: Erik Nishida, research scientist at Sandia National Laboratories
- Qualitative statement of contribution: I designed the research and supervised the experimental work performed by the second author. I developed and coded an optimization routine used in the design-of-experiments. I drafted the paper alone.

Section 3. Works published (or in equivalent status) while in previous rank(s) at UT Austin (if applicable)

Not applicable.

Section 4. Works published (or in equivalent status) while in previous rank(s) at other institutions (if applicable)

Journal Papers

J.T. Foster, W. Chen, and V.K. Luk. Dynamic crack initiation toughness of 4340 steel at constant loading rates. Engineering Fracture Mechanics, 78(6):1264 – 1276, 2011. doi:10.1016/j.engfracmech.2011.02.019.

- Co-authors: Weinong Chen, professor at Purdue University, V.K. Luk, research scientist at Sandia National Laboratories.
- Qualitative statement of contribution: I designed the research with the second and third author. I performed all the experiments and drafted the paper alone. I wrote reviewer rebuttal statements.

J.T. Foster, S.A. Silling, and W.W. Chen. Viscoplasticity using peridynamics. International Journal for Numerical Methods in Engineering, 81(10):1242–1258, 2010. doi:10.1002/nme.2725.

- Co-authors: Stewart Silling, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I developed implemented the computational plasticity model for validation. I drafted the paper alone and wrote reviewer rebuttal statements.

J.T. Foster, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling Loose Joints in Elastic Structures–Experimental Results and Validation. Journal of Vibration and Control, 15(4):549–565, 2009. doi:10.1177/1077546307082908.

- Co-authors: Alan Barhorst, professor at Texas Tech University, C.N. Wong, postdoctoral researcher at Texas Tech University, Matthew Bement, research scientist at Los Alamos National Laboratory
- Qualitative statement of contribution: I designed the research with the second author. I performed all experiments. I worked on the modeling and drafted the paper with the second author.

Conference Papers

J.T. Foster, D.J. Frew, M.J. Forrestal, E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. Experimental and Applied Mechanics, Volume 6, pages 229–237, 2011. doi:10.1007/978-1-4614-0222-0_29.

- Co-authors: Daniel Frew, owner of Dynamic Systems and Research, Inc., Michael Forrestal, research scientist at Sandia National Laboratories (retired), Eric Nishida, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I performed and supervised experiments with the fourth author. I developed a mathematical model for the design-of-experiments and drafted the paper with the third author. I edited the paper before submission.

J.T. Foster, W. Chen, and V.K. Luk. Dynamic fracture initiation toughness of high strength steel alloys. In DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading, volume 1, pages 407–412, 2009. doi:10.1051/dymat/2009058.

- Co-authors: Weinong Chen, professor at Purdue University, V.K. Luk, research scientist at Sandia National Laboratories.
- Qualitative statement of contribution: I designed the research with the second and third author. I performed all the experiments and drafted the paper alone.

J.T. Foster, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading, volume 2, pages 1529–1535, 2009. doi:10.1051/dymat/2009216.

- Co-authors: Stewart Silling, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I developed implemented the computational plasticity model for validation. I drafted the paper alone.

J.T. Foster, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In SEM 2009 Conference on Experimental and Applied Mechanics, number 33. SEM, 2009.

- Co-authors: Stewart Silling, research scientist at Sandia National Laboratories, Weinong Chen, professor at Purdue University
- Qualitative statement of contribution: I designed the research with the second and third author. I developed implemented the computational plasticity and failure model for validation. I drafted the paper alone.

J.T. Foster, V.K. Luk, and W. Chen. Dynamic initiation fracture toughness of high strength steel alloys. In Proceedings of the XIth International Congress and Exposition. Orlando, Florida Society for Experimental Mechanics Inc, volume 77, 2008.

- Co-authors: Weinong Chen, professor at Purdue University, V.K. Luk, research scientist at Sandia National Laboratories.
- Qualitative statement of contribution: I designed the research with the second and third author. I performed all the experiments and drafted the paper alone.

D.A. Dederman, D. Burnett, J.T. Foster, and J.A. Dykes. In Situ Penetration Testing of Darts with 16-Inch Mobile Gas Gun. In Proceedings of 24th International Symposium on Ballistics, number TB149, 2008.

- Co-authors: Douglas Dederman, Damon Burnett and James Dykes, research scientists at Sandia National Laboratories.
- Qualitative statement of contribution: I designed the research with all authors. I performed all the experiments with the last author. I edited the paper before submission.

J.G. Averett, J.D. Cargile, J.T. Foster, and V.K. Luk. Oblique Perforation of Unreinforced Concrete Targets: Experiments and Numerical Simulations. In Limited Proceedings of 77th Shock and Vibration Conference, 2007.

- Co-authors: Jeffrey Averett and J. Donald Cargile, research scientists at US Army Engineer Research and Development Center (ERDC), Vincent Luk, research scientists at Sandia National Laboratories.

- Qualitative statement of contribution: I designed the research with the second and last author and supervised the experiments performed by the first author. I performed computer predictions for comparisons to the experimental results. I drafted the paper with the first author and edited the paper before submission.

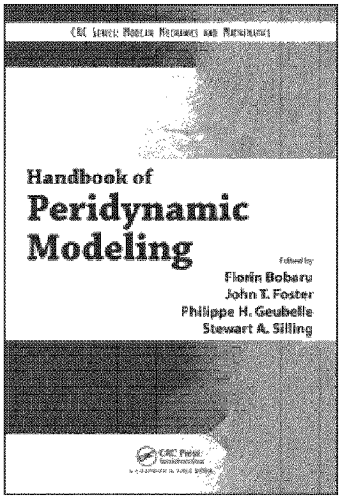
J.G. Averett, J.D. Cargile, J.T. Foster, and V.K. Luk. Projectile Deceleration Due to Perforation Through Layers of Unreinforced Concrete Targets. In Limited Proceedings of 76th Shock and Vibration Conference, number U-045. SAVIAC, 2006.

- Co-authors: Jeffrey Averett and J. Donald Cargile, research scientists at US Army Engineer Research and Development Center (ERDC), Vincent Luk, research scientists at Sandia National Laboratories.
- Qualitative statement of contribution: I designed the research with the second and last author and supervised the experiments performed by the first author. I drafted the paper with the second author and edited the paper before submission.

J.T. Foster, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling and Experimental Verification of Frictional Contact-Impact in Loose Bolted Joint Elastic Structures. In Proceedings of IDETC'05, number DETC2005-85465. IDETC, 2005.

- Co-authors: Alan Barhorst, professor at Texas Tech University, C.N. Wong, postdoctoral researcher at Texas Tech University, Matthew Bement, research scientist at Los Alamos National Laboratory
- Qualitative statement of contribution: I designed the research with the second author. I performed all experiments. I worked on the modeling and drafted the paper with the second author.

Letter of acceptance for work yet published lost, however the below screenshot (found at https://www.crcpress.com/Handbook-of-Peridynamic-Modeling/Bobaru-Foster-Geubelle-Silling/p/book/9781482230437) used as proof of upcoming publication.



Description

Table of Contents

Handbook of Peridynamic Modeling

Florin Bobaru, John T. Foster, Philippe H Geubelle, Stewart A. Silling

Hardback
$159.96

November 11, 2016 Forthcoming by Chapman and Hall/CRC
Reference - 547 Pages - 230 B/W Illustrations
ISBN 9781482230437 - CAT# K22665
Series: Modern Mechanics and Mathematics

Features

- Presents contributions from top researchers working in the field
- Offers a clear and quick introduction to peridynamics and shows advanced applications
- Provides motivations for nonlocal modeling and eliminates common misconceptions
- Discusses the mathematics and software implementation of peridynamics
- Covers peridynamic models of fracture, damage, and fragmentation
- Describes practical multiscale and multiphysics models of nonlocality

Summary

This handbook covers the peridynamic modeling of failure and damage. Peridynamics is a reformulation of continuum mechanics based on the integration of interactions rather than the spatial differentiation of displacements. The book extends the classical theory of continuum mechanics to allow unguided modeling of crack propagation/fracture in brittle, quasi-brittle, and ductile materials; autonomous transition from continuous damage/fragmentation to fracture; modeling of long-range forces within a continuous body; and multiscale coupling in a consistent mathematical framework.

PGE Budget Council Statement
For
John T. Foster

Teaching Contributions and Effectiveness

Portfolio

Dr. John Foster taught the following courses at the University of Texas at San Antonio before joining the Department of Petroleum Engineering at The University of Texas at Austin as an assistant professor:

ME 4603, Finite Element Analysis (undergraduate class)
ME 4953/5013, High-Performance Computing (combined undergraduate and graduate class)
ME 6043, Continuum Mechanics (graduate class)

He also has taught the following courses while he has been an assistant professor in the Petroleum Engineering Department at UT:

PGE 334, Reservoir Geomechanics (undergraduate class)
PGE 323M, Reservoir Engineering III (undergraduate class)
PGE 383, Advanced Geomechanics (undergraduate class, but majority of students have been graduate students)

Dr. Foster's areas of teaching have mainly concentrated on geomechanics and computational methods for engineering application. He has taught several undergraduate courses with moderate to large enrollments during the period that he has been an assistant professor in our department. The enrollments of graduate students in his Advanced Geomechanics (PGE 383) course has been on par with other graduate courses taught in the department.

Comparative Ranking

Dr. Foster's summary of teaching statistics is outlined in Table 1. In this table, "Total" represent the combined number of students and combined average course evaluations for the courses taught at UT and UTSA.

Table 1. Summary of Course-Instructor Ratings

Metric	Value	
	UT	Total
Total of students taught in organized courses	**198**	363
Average instructor evaluation for UG courses	**3.9**	4.1
Average instructor evaluation for Grad courses	**4.6**	4.5
Average course evaluation for UG courses	**3.8**	4.0
Average course evaluation for Grad courses	**4.3**	4.4

Dr. Foster's teaching style has been quite different than other professors in our department, as he states in his teaching statement, he is a "non traditional teacher." For example, in a course that he taught in the Department of Mechanical Engineering at the University of Texas at San Antonio in high-performance computing, he had posted all of the lectures and the course material on YouTube in a specific website for the students. Then, for the class, the students were required to watch the videos before attending the class. Also, he had prepared quizzes that the students were required to take and the quizzes were automatically graded in order for him to monitor the students' progress and obtain feedback from the students. Then, the students would attend a computer lab in order to work on computer programming assignments and seek the instructor's help as needed instead of attending a regular lecture. He has developed about 60 videos for this class and since the videos are available on YouTube, many people all over the world have had the opportunity to view Dr. Foster's course material over the last four years. He updates the material for this course as needed and augments the lectures with new topics as needed. He believes that the students should be given alternative options to learn the course material. In two of the courses he has been teaching at UT (PGE 334 and PGE 383), he uses a tablet that is connected to his laptop to deliver his lectures by writing on the tablet and at the same time retrieving prepared material from his laptop. Subsequently, he would post the lectures on YouTube and the lectures are available for the students to view for the remainder of the semester. He has been in discussion with a few professors in the department in order for them to adapt the same technology in their courses. In his homework and exams, he emphasizes applications to real world engineering problem solving. He teaches the students how to apply computational methods in solving practical problems that are encountered in engineering practice. He believes that the students should be able to use scientific computing in their day-to-day work to take advantages of the newest algorithm and computer developments to solve complex problems. We believe that his teaching style is unique and, based on the feedback that we have received from the students on the teaching evaluations for Dr. Foster as well as verbal feedback that the graduate advisor has received from the graduate students registered in Dr. Foster's Advanced Geomechanics class, the students are very pleased with Dr. Foster's teaching style and have indicated that they were able to learn the material presented in the course well due to Dr. Foster's teaching approach. Dr. Foster has been very receptive in accepting feedback from the students in his classes. In general, he has received excellent teaching evaluations. The first time that he taught PGE 334, Reservoir Geomechanics, in spring 2015 with registration of over 80 students, his teaching evaluation was a 3.4; however, next time that he taught the course, his teaching evaluation improved to a 4.3. This improvement in his teaching evaluation was due to better preparation and possibly due to the usage of computer technology in classroom as indicated in the foregoing statements. Dr. Foster was awarded the 2015 Society of Petroleum Engineers Faculty Innovative Teaching Award. Also, his teaching assistant for PGE 323M won the William S. Livingston Outstanding Graduate Student Academic Employee Award in fall 2015. This was the first time that a student from the Cockrell School of Engineering had won this award. Dr. Foster prepared the nomination package for this prestigious university-wide award on behalf of the student.

Graduate Students
Dr. Foster has supervised the completion of one PhD student in Mechanical Engineering at the University of Texas at San Antonio. He is now supervising 7 PhD students (5 as sole supervisor and 2 as co-supervisor). Three of the PhD students are registered in the Aerospace Engineering and Engineering Mechanics Department and the rest are petroleum engineering students. He also supervises two master students in petroleum engineering. In addition to supervising his own students, Dr. Foster has participated in several PhD supervisory committees in the department.

Classroom Audits
Professor Jon Olson audited Dr. Foster's PGE 334, Reservoir Geomechanics, Hydraulic Fracturing, class on April 11, 2016. This course is comprised of three-hour long lectures per week as well as a two-hour laboratory that meets five times during the entire semester. Below are some of Dr. Olson's observations about the class:

"Dr. Foster began the lecture by reviewing the topics covered in the previous class and reminding the students of the plan for the future – to go through the basis for hydraulic fracture models. I thought this introduction helped set a good context for the students."

"He provided context for the importance of fractures by reviewing the history of premature failure of engineering structures due to propagation of cracks. He then presented the classical Griffith energy balance approach for predicting fracture, including the math derivation, which in the end provides the students with several useful practical equations. ..... By the end of the lecture, he was able to bring the theoretical discussion to bear on the practical application for petroleum engineers – hydraulic fracturing. At the conclusion of the lecture, he previewed the topic for the next class..."

"Overall I thought Dr. Foster's presentation of the material was very systematic and easy to follow, and as mentioned before, I felt he did a good job providing historical background and relevant context for the students."

Concluding Remarks
Based on student comments, CIS comparative rankings, peer evaluation and evidence of continual improvement, Dr. Foster's record meets or exceeds expectations for promotion. The PGE Budget Council Tenure and Promotion Committee endorse his promotion to the rank of associate professor.

K. Sepehrnoori
Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee

Candidates Statement on Teaching

John T. Foster, Ph.D., P.E.

I am a somewhat non-traditional teacher in that I rarely give a full 50/75 minute back-to-the-students blackboard-style lecture, preferring interactive project-based learning whenever possible. I have been an early adopter of the reverse classroom approach. I have developed a course in high-performance computing (HPC) for engineers in which all of the traditional lecture material is posted to YouTube and embedded in a course specific website that I developed. I taught this course for 3 semesters at The University of Texas at San Antonio (UTSA) and am preparing to teach a similar course in the Spring of 2017 to The University of Texas at Austin's (UT Austin) Petroleum and Geosystems Engineering (PGE) students. In this class, the students are then required to watch the videos[1] before attending class. Accompanying the videos are automatically graded quiz questions to ensure the students complete the videos and continuously provide a feedback assessment of their progress. I originally wrote the software for this automated quiz grading as well as developed the question bank and associated answers, and now am migrating the question bank to the Canvas system. The in-class part of the course is then offered in a computer lab where daily exercises are carried out in a way that offers students an opportunity to solve problems on their own with my immediate assistance when they need it. Independent projects replace tests in this course. Thus far, I have created about 60 videos for this class. Interestingly, these videos are being watched more often by others, outside of the formal classroom. They currently have over 230K unique views representing more than 800K minutes of viewing on YouTube from interested people in almost every country in the world. Figure 1 shows the historical accumulation of views for the HPC course.

Figure 1. Historical daily views of HPC course YouTube channel

[1] http://johnfoster.pge.utexas.edu/HPC/video-lectures/

I believe this serves as an avenue for reputation enhancement, through others familiarizing themselves with my expertise on this topic and seeking out my other contributions in research, etc. Additionally, it creates a lasting catalogue of valuable reference material for my own students and researchers as well as other students at UT Austin.

This flipped-classroom format may not be appropriate for all classes; however, I firmly believe in providing the students a menu of options for learning, especially when technology can provide this at little or no time-cost to me. I have used this methodology in several PGE courses at UT Austin including PGE 383 Advanced Geomechanics[2], PGE 334 Reservoir Geomechanics[3], and PGE 323M Reservoir Engineering III[4]. In the classroom, when delivering traditional lectures, I use a tablet peripheral interface to my laptop, where I can either develop lecture notes from scratch on blank paper or I can annotate prepared material in real-time. This makes the transition to prepared slides, demos, videos, web-based materials, or live-coding on the laptop during the lecture seamless. While delivering the lecture, I wear a microphone and screen-capture my computer desktop while simultaneously projecting to the screen in the lecture hall. At the end of class, I post the lecture notes developed in class along with a YouTube video of my lecture. Every lecture is recorded and available for the students' future reference. I spend a little time post-producing the lecture videos to break-up the full lecture into 5–20 minute topical segments. This post-production of the lectures makes it easier for the students to find the material they are interested in when reviewing for exams or working assignments. Additionally, this allows me to easily assemble an appropriately timed lecture in the advent of an absence in future semesters. Written comments from students over the years have overwhelmingly expressed gratitude for these reference videos and other materials, as not all students learn in the same manner, it provides a way to accommodate several different learning styles. Like the HPC course described previously, these videos are being watched by students around the world and have views cumulatively exceeding 100K. Professors Maša Prodanović and Eric van Oort in the PGE Department have adopted and adapted parts of this methodology after discussions with me regarding the tools I use. Other professors have expressed interest in adopting these techniques, and the possibility of using some of these methods to prepare material for a future online Master of Science degree in PGE has been discussed, including at the PGE 2015 faculty retreat where I gave a live demonstration.

It has been my experience that many, if not most, engineering students are aided by visual learning tools and (where appropriate) I always try to incorporate these into my lectures. Figure 2 shows several frames from an animated computer visualization of tangent lines being drawn and new approximations being computed as a Newton's method nonlinear solver converges to a root. This is one of many similar such visual aids that I developed

---

[2] http://johnfoster.pge.utexas.edu/PGE383-AdvGeomechanics/

[3] http://johnfoster.pge.utexas.edu/PGE334-ResGeomechanics/

[4] http://johnfoster.pge.utexas.edu/PGE323M-ResEngineeringIII/

(i.e. wrote the Mathematica code) for a course on numerical methods[5], these notebooks are currently being translated to an open-source interactive book[6].

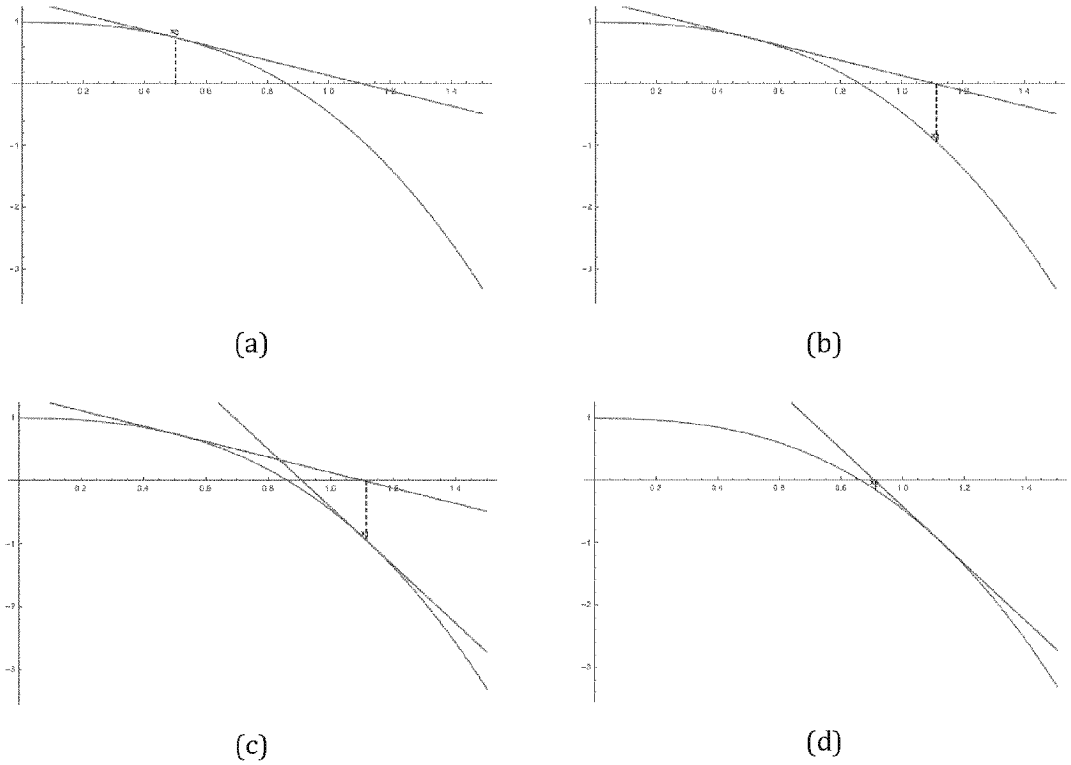


Figure 2. Sequence (a)-(d) taken from animation of Newton's method converging to a root

I prefer a grading procedure which emphasizes homework assignments and projects that include applications to real engineering problems that the personal computer is needed to solve. As a working engineer, it was a rare case to encounter a problem that could be easily solved analytically; therefore, the computer plays a vital role in the education of my students just as it would assist a working engineer. I would say the primary educational goal for every course I teach is for the students to become better programmer/problem solvers through the use of scientific computing. I require that the students write computer code for nearly every assignment by designing problems that require iteration or full-field and/or multiple parameter space visualizations that are too difficult or intractable to work by hand. I do not insist they use any particular language or engineering software toolbox,

---

[5]https://github.com/johntfoster/numerical_methods_book/tree/master/mathematica_notebooks

[6]https://github.com/johntfoster/numerical_methods_book/blob/master/TableofContents.ipynb

but rather emphasize choosing the right tool for the task by discussing the pro/cons regarding speed, algorithm robustness, and ease of programming with them. Being proficient in several programming languages and engineering software packages (virtually all of the most commonly used ones) allows me to do this with ease. I emphasize good coding practices that make their codes easier to debug. I require them to solve verification problems, and to test their code so that they have confidence that the solutions they turn in are correct. I frequently live-code on my laptop in class to explain not only syntax, but the logic of programming which often is the logic of problem solving. I even discuss software developer operations such as agile, testing, and version control when appropriate. I have held ad hoc tutorials outside of class on such topics[7]. The students I have taught so far seem to respond well to these course designs, despite the common misconception that "engineers don't like to code". It's possible that engineers do not recognize the full worth of programming when taught as a stand-alone subject. When taught programming as part of the art of problem solving, nearly every student I have encountered develops an appreciation and they have expressed this in written comments during course evaluations.

I firmly believe that, just as no exceptions are ever made for engineering students who must use a slide-rule when preparing exam questions (i.e. it's an expectation that all students have access to a scientific calculator), we have reached the time when the same philosophy should be applied with respect to the laptop computer. When teaching PGE 334 Advanced Geomechanics in the Spring of 2016, for the first time, I allowed students to use their personal or department provided laptops during exams. In this course, there are a class of problems which require using rotation matrices to perform multiple coordinate transformations for the solution. If the students are asked to solve these problems on an exam, an assessment of their performance is influence by how quickly they can type matrices into their calculators. This is not in any way an assessment of their understanding. I allowed them to program the coordinate transformations and bring their codes with them to class. I even provided verification solutions so they could check that their code was working properly before the exam. They could simply use the code during the problem solution with little worry about making algebraic or typographic errors and allowing them to focus on their physical understanding of the problem. The overall grades on otherwise very similar exams improved dramatically from the previous semester when I taught this course.

Being formally trained as a mechanician, I have a very different background than a traditional petroleum engineer; however, it is my belief that this skill set adds tremendous value in a future where unconventional resources will play a large role in the petroleum industry. These unconventionals require extensive knowledge of geomechanics to efficiently and safely bring into production. Indeed, PGE's curriculum has already begun to reflect this by adding both undergraduate and graduate courses in geomechanics over the last several years (i.e. PGE334 and PGE373, both of which I have taught). Additionally, my background in scientific computing and the numerical solution of PDE's allowed me to seamlessly begin to teach courses in reservoir simulation (PGE323M).

---

[7]http://johntfoster.github.io/posts/git-and-github-tutorial.html

I have always been rated highly in student evaluations at both universities where I have taught. (see *Table 1* and supplemental material). The worst instructor evaluation I received was in PGE 334 Advanced Geomechanics during the Spring of 2015 (my first time teaching this course and the largest course I had ever taught at the time by a significant amount). The evaluation was a 3.4 which I improved to a 4.3 the next time I taught the course. I attribute the improvement to better preparation (second time teaching the course), a more knowledgeable and efficient use of teaching assistants in a large class, as well as implementing new techniques, such as using laptops for exams as previously discussed. This improvement was in spite of requiring the students to program for every assignment, something they supposedly don't like to do! Generally my instructor ratings are in the 4's. *Table 1* provides a summary of my course and instructor ratings since becoming an assistant professor in the Fall of 2011 (three years at UTSA and two years at UT-Austin).

With regard to assisting (primarily graduate) students in their learning process, I maintain an active weblog[8] of helpful tips and answered questions. Generally, these are related to scientific computing topics. I try to maintain a philosophy where anytime I believe a student's question will come up again in the future, I write a blog detailing the path forward as opposed to providing an individual answer. This has paid off numerous times where I can simply point the students to a blog post where I've already answered their specific or a similar question.

I believe I have demonstrated real innovation in the classroom, notably through the use of technology, and I was awarded the 2015 Society of Petroleum Engineers Faculty Innovative Teaching Award. Another accomplishment I am very proud of, but is admittedly not completely my own, was for my Teaching Assistant for PGE 323M in Fall 2015, Nkemakonam Egboga, to be awarded the William S. Livingston Outstanding Graduate Student Academic Employee Award by the Graduate Student Assembly. This award, for which I prepared the nomination package, is given to one graduate teaching assistant in the entire university. Nkemakonam was the first PGE student and the first Cockrell School of Engineering student to ever be given this award.

Finally, I believe experience with these innovative approaches to teaching will give me an advantage if called on to participate in the PGE Departments forthcoming online MS program or The University of Texas System's delivery of online or massively online courses, e.g. the edX program, something I would be interested in doing in the future.

---

[8] http://johntfoster.github.io/

Table 1. Summary of Course-Instructor Ratings

Metric	Value	
	UT	Total[9]
Total of students taught in organized courses	**198**	363
Average instructor evaluation for UG courses	**3.9**	4.1
Average instructor evaluation for Grad courses	**4.6**	4.5
Average course evaluation for UG courses	**3.8**	4.0
Average course evaluation for Grad courses	**4.3**	4.4

Table 2. Course Schedule by Semester with Number of Students Indicated

	UTSA[10,11]					UT Austin[12]			
Course	**F11**	**S12**	**F12**	**F13**	**S14**	**F14**	**S15**	**F15**	**S16**
ME4603	21								
ME6043		3			6				
ME4953/5013			39	48	48				
PGE383						13		14	
PGE334							81		25
PGE323M								65	

[9] ME4953/5013 was a co-listed graduate and undergraduate class. The majority of the students were graduate students and the course was taught as a graduate class, i.e. there were no special assignments or exceptions made for undergraduates in the course. The evaluations were performed together and combined so I used the results for this course only for the Grad course averages.

[10] My teaching workload was 1 course per semester for my first 2 years at UTSA

[11] S13 was a teaching buyout

[12] My teaching workload was 1 course per semester for my first year at UT-Austin

Table 3. Summary of Graduate Students Currently Supervised at UT Austin

Student *Name*	Co-Supervisor	Degree	Start Date	Date Reached Candidacy	Date Expected to Reach Candidacy[13,14]	Expected Graduation Date[15]
Michael Brothers		PhD (EM)	8/2014		8/2017	5/2018
Eric Lynd†	Q. Nguyen	PhD (PGE)	8/2014		5/2017	5/2018
Rambod Tabasi		PhD (EM)	8/2014		5/2017	5/2018
Sai Uppati		MS (PGE)	01/2008			12/2016
Jason York★		PhD (PGE)	1/2015		9/2016	12/2017
Mingyaun Yang★	Q. Nguyen	PhD (PGE)	8/2015		12/2016	5/2018
Masoud Behzadinasab★		PhD (EM)	8/2015		12/2016	5/2018
Yu Leng		PhD (PGE)	8/2015		12/2016	5/2018
Xiao Xu		MS (PGE)	8/2015			5/2017

[13] Candidacy in PGE requires passing a written qualifying exam and an oral proposal. Candidacy in EM requires passing both written and oral examinations.

[14] I've used an ⋆ to indicate students who have passed all written exams and a † to indicate students who have passed a subset of written examinations.

[15] It is expected that both Sai Uppati and Xiao Xu will stay for a PhD degree at UT beyond their MS graduation.

John T. Foster
Department of Petroleum and Geosystems Engineering
Course Rating Averages

Tenure candidates must include all years in rank.
All other candidates must include, at minimum, the three most recent years.
What source was used to complete this chart? CIS Summary provided by the Dean's Office
(e.g.. My CIS, summary provided by Provost's Office, etc.)

PGE 379: Advanced Geomechanics

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2014	13	13	4.3	4.0
Fall 2015	14	7	4.9	4.6
Mean	**14**	**10**	**4.6**	**4.3**

PGE 334: Reservoir Geomechanics

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2015	81	38	3.4	3.2
Spring 2016	25	11	4.3	4.1
Mean	**53**	**25**	**3.9**	**3.7**

PGE 323M: Reservoir Engineering III

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2015	65	47	4.1	4.0
Mean	**65**	**47**	**4.1**	**4.0**

Summary of Recent (All Years In Rank) UT Austin Course-Instructor Survey Resul
Overall Course/Instructor Items

Semester	Course Number	Course Title	Enrollment		Instructor Averages*		College/School Averages**		
			No. of Students Enrolled on 12th Class Day	No. of Surveys Returned at End of Semester	Overall Instructor Rating Avg.	Overall Course Rating Avg.	Overall Instructor Rating Avg.	Overall Course Rating Avg.	No. Classes Surveyed
Fall 14	PGE 379	ADVANCED GEOMECHANICS	13	13	4.3	4.0	N/A ***	N/A ***	N/A
Spring 15	PGE 334	RESERVOIR GEOMECHANICS	81	38	3.4	3.2	N/A ***	N/A ***	N/A
Fall 15	PGE 323M	RESERVOIR ENGINEERING III	65	47	4.1	4.0	N/A ***	N/A ***	N/A
Fall 15	PGE 379	ADVANCED GEOMECHANICS	14	7	4.9	4.6	N/A ***	N/A ***	N/A
Spring 16	PGE 334	RESERVOIR GEOMECHANICS	25	11	4.3	4.1	N/A ***	N/A ***	N/A

*For the computation of the averages, points were assigned to student responses as follows:
Excellent = 5, Very Good = 4, Satisfactory = 3, Unsatisfactory = 2, Very Unsatisfactory = 1

**College/school averages are the average of class averages, based on all courses surveyed in the instructor's college or school during the academic year in which the course was taught.

***New CIS forms were implemented in the fall 2000 semester. The average rating on the overall course and instructor questions on the new Basic and Expanded forms have been found to be approximately 0.1 to 0.2 points lower than those ratings on the old Common form.

Prepared by the Measurement and Evaluation Center

DEPARTMENT OF PETROLEUM AND GEOSYSTEMS ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN
CPE 2.502 • Austin, Texas 78712 • (512) 471-3161 • Telefax (512) 471-9605

August 11, 2016*

To whom it may concern:

On April 11, I sat in on the lecture of Dr. John Foster for PGE 334, Reservoir Geomechanics. This course is comprised of 3 hours of lecture per week and a 2 hour lab that meets 5 times throughout the semester. The lab exercises were initially designed by me and improved upon by Dr. Nicolas Espinoza of the PGE faculty. Dr. Foster has an experienced TA that manages the lab effectively.

Dr. Foster began the lecture by reviewing the topics covered in the previous class and reminding the students of the plan for the future – to go through the basis for hydraulic fracture models. I thought this introduction helped set a good context for the students.

In the lecture, Dr. Foster was explaining fracture mechanics to a group of students that were familiar with mechanics but had never been introduced to the mechanical fundamentals of fracture. He provided context for the importance of fractures by reviewing the history of premature failure of engineering structures due to propagation of cracks. He then presented the classical Griffith energy balance approach for predicting fracture, including the math derivation, which in the end provides the students with several useful practical equations. He referred back to principles with which the students should be familiar coming from solid mechanics, again to provide them with some context for the arguments. By the end of the lecture, he was able to bring the theoretical discussion to bear on the practical application for petroleum engineers – hydraulic fracturing. At the conclusion of the lecture, he previewed the topic for the next class, which was to go over the analytical expressions that had been derived in petroleum engineering for hydraulic fracture design.

Overall I thought Dr. Foster's presentation of the material was very systematic and easy to follow, and as mentioned before, I felt he did a good job providing historical background and relevant context for the students. He discussed with me afterwards that he was capturing the lecture on his tablet computer, which is the device he used to write his lecture notes – equation, short textual outline statements, and drawings. During the lecture there were not many questions, and the attendance was sparse. I discussed the attendance issues with Dr. Foster after the class and he assured me that low attendance was not the rule, and that on the particular day I attended class, there was another major assignment due I believe in another class that was possibly responsible for drawing the students away.

Respectfully submitted,

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair

*I took details notes and hand-wrote my impressions of this teaching observation on April 11, but was unaware that I had not formally filed the write-up until today.

THE UNIVERSITY OF TEXAS AT AUSTIN
OFFICE OF GRADUATE STUDIES
COMMITTEE REPORT, MASTERS AND DOCTORAL
FOR FOSTER, JOHN T

NAME	EID	LAST SEM	COMM POSITION	MAST OR DOCT	DEGREE	FIELD	YYS	2ND DEGREE	FIELD	YYS
BRYANT, ERIC CUSHMAN	ecb2256	166	MEMBER	M	M.S.E.	PETROLEUM ENG	20166			
ELAHI NARAGHI, MORTEZA	me9484	169	MEMBER	D						
FENG, YONGCUN	yf2329	166	MEMBER	D	PH.D.	PETROLEUM ENG	20166			
OUCHI, HISANAO	ho2433	162	MEMBER	D	PH.D.	PETROLEUM ENG	20162			
WANG, HAOTIAN	hw5699	169	MEMBER	D						
WANG, WEIWEI	ww5589	169	MEMBER	D						
WILSON, ZACHARY ADAM	zaw98	169	MEMBER	D						
WU, CHENGLIN	cw23932	169	MEMBER	D						
YI, SHITING	sy6584	169	MEMBER	D						
YUE, KAIMIN	ky2668	169	MEMBER	D						
YUE, KAIMIN	ky2668	169	MEMBER	M	M.S.E.	PETROLEUM ENG	20152			

John T. Foster
Department of Petroleum and Geosystems Engineering
List of Postdoctoral Fellows Supervised

1. James O'Grady, Ph.D., graduated from UTSA 2014, supervised 2015 at UT-Austin
2. Rezwanur Rahman, Ph.D., graduated from University of Alabama, 2012, supervised 2013-2014 at UTSA and 2015 at UT-Austin
3. Shamima Yasmin, Ph.D. graduated from Universiti Sains Malaysia, 2010 supervised at UTSA 2013

PGE Budget Council Statement
For
John T. Foster

Research/Scholarly/Creative Contributions

This budget Council statement summarizes the research, scholarly and creative contributions of Dr. John Foster.

Dr. John Foster's main field of research is computational and experimental mechanics. We have broken down this research statement into four distinct parts: scholarly and creative contributions, research funding, graduate student supervision and finally professional reputation and recognition.

As shown in detail in his promotion package Dr. Foster has authored 22 journal publications [19 in rank]. In addition, he has 14 peer-reviewed conference proceedings [5 in rank]. In most of these publications Dr. Foster has been the first author or made significant contributions to the publication. Many of these publications have been in highly reputed journals. This publication record is outstanding and ranks among the top for assistant professors in our field. In studying his publications, it is evident that he has a broad understanding of both the computational and experimental aspects of mechanics. I would particularly like to highlight his significant contributions in the new field of peridynamics which provides a mesh-free method for solving problems in both solid and fluid mechanics. He has for the first time-developed methods for applying peridynamics to poroelastic problems. This fundamental contribution allows us to use this powerful method to address problems in fluid flow in porous media as well as simulate the growth of complex fractures in rocks. He has recently completed editing a book on this topic titled The Handbook of Peridynamics.

Dr. Foster comes to the field of petroleum engineering with a mechanics and computational background. Most of his publications are not in petroleum engineering journals since he has been associated with this field for a relatively short time. However, his fundamental contributions in mechanics and computational methods are widely applicable to many fields such as hydraulic fracturing and drill string mechanics. We fully expect that as Dr. Foster gets more involved with practitioners in the field he will easily be able to apply his fundamental methods to problems in oil and gas exploration and production. He has already made significant strides in this direction with his involvement in research related to many aspects of hydraulic fracturing, reservoir simulation and drilling. He has visited several industry research labs, such as Exxon Mobil and GE and given talks that have been very well received.

Dr. Foster has been very successful at raising research funds from a wide variety of funding sources. The total research funding he has been able to generate both as a PI and as a co-PI are in excess of $10 million. Of this, he is the primary PI on $2.4 million worth of research funding.

These are very impressive numbers for an assistant professor in any field of engineering or science. Perhaps what is even more impressive is that this funding has come from a wide variety of funding sources. This bodes well for his long-term success at maintaining an active and well-funded research program. With his background at Sandia national labs, he has been able to continue his research collaborations and funding with the Army Research Laboratory as well as with the Air Force Office of Scientific Research. He is also currently a co-PI on a large Department of Energy (DOE) grant related to the application of peridynamics to hydraulic fracturing. This has allowed him to actively pursue his fundamental research in computational mechanics and support a rather large research group of PhD students and research scientists. In summary, Dr. Foster has an impressive and proven track record of successful research fundraising.

Dr. Foster has been able to build up a fairly large and active research group of graduate students and postdocs. He currently supervises seven PhD students and two MS students in petroleum engineering as well as in engineering mechanics. While at UTSA, he completed the supervisions of one PhD dissertation and five MS theses. In addition, he supervises and co-supervises postdoctoral fellows, undergraduate researchers and serves on several PhD dissertation committees. This level of research activity puts him in the top quarter of all faculty members in our department as well as faculty members in our field nationwide.

Dr. Foster is the recipient of the 2013 Air Force Office of Scientific Research Young Investigator award. He has organized several workshops such as the US National Congress on Computational Mechanics and a workshop on Mesh-Free Methods for Computational Science and Engineering. Dr. Foster's research accomplishments are also reflected in his involvement as a reviewer for over 12 journals. His intense involvement within the technical and academic community in his field clearly demonstrate his leadership skills and his ability to collaborate with his colleagues in research.

In summary, Dr. Foster has made significant contributions to the technical literature in his field of theoretical and experimental mechanics. He has a very impressive publication record, a track record of successful fundraising, an active and productive research group and a stellar reputation among his technical colleagues. He is widely recognized as a rising star who we expect will become a leader in his field in the coming decades.

K. Sepehrnoori

Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee

Five Most Significant Works

John T. Foster

1. H. Ouchi, J.R. York, A. Katiyar, **J.T. Foster**, and M.M. Sharma. A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach. *Computational Mechanics*, 55(3):561–576, March 2015. doi:10.1007/s00466-015-1123-8.

2. A. Katiyar, **J.T. Foster**, H. Ouchi, and M.M. Sharma. A peridynamic formulation of pressure driven convective fluid transport in porous media. *Journal of Computational Physics*, 261:209–229, March 2014. doi:10.1016/j.jcp.2013.12.039.

3. J.T. O'Grady and **J.T. Foster**. Peridynamic plates and flat shells: A non-ordinary state-based model. *International Journal of Solids and Structures*, 51(25–26):4572–4579, 2014. doi:10.1016/j.ijsolstr.2014.09.003.

4. **J.T. Foster**, S.A. Silling, and W. Chen. An energy based failure criterion for use with peridynamic states. *International Journal of Multiscale Computational Engineering*, 9(6):675–688, 2011. doi:10.1615/IntJMultCompEng.2011002407.

5. **J.T. Foster**, S.A. Silling, and W.W. Chen. Viscoplasticity using peridynamics. *International Journal for Numerical Methods in Engineering*, 81(10):1242–1258, 2010. doi:10.1002/nme.2725.

Candidates Statement on Research

John T. Foster, Ph.D., P.E.

Overview. Since becoming an assistant professor in the Fall of 2011 (three years in the Department of Mechanical Engineering at The University of Texas at San Antonio (UTSA) and 2 years in the Department of Petroleum and Geosystems Engineering at The University of Texas at Austin (UT Austin), I have rapidly demonstrated an ability to acquire funding from multiple sources across a wide spectrum of fundamental research.

My move to UT Austin at the start of my 4th year in rank signified a career transition, from a research portfolio that was primarily funded by government grants focusing on the fundamental science of material failure in solid mechanics and computational methods development, to now a mix of fundamental science as well as technology advancement targeting energy applications, both in the oil and gas sector as well as geothermal. This transition also coincided with a massive downturn in the oil and gas economy; but nevertheless, I have been able to develop newly funded programs (GE Global Research) and potential future partnerships. I have recently given invited talks at ExxonMobil Corporate Strategic Research, Total, and Schlumberger-Doll Research Center, as well as many academic institutions (see CV for complete list).

I am a 2013 Air Force Office of Scientific Research (AFOSR) Young Investigator Awardee. In addition to AFOSR, I have received funding from Sandia National Laboratories (SNL), Army Research Laboratory (ARL), Army Research Office (ARO), The National Energy Technology Laboratory (NETL), and GE Global Research. I was an (equal share) co-PI for a prestigious Multidisciplinary University Research Initiative (MURI) award. With everything taken into account, I have been awarded over $2 million in funding for my research as PI and over $10 million as co-PI. I have been awarded these grants at both UTSA and UT Austin with several spanning my time at both universities. Table 2 summarizes these projects and provides the exact funding amounts. My collaborators on these efforts include top researchers at UT Austin (NETL award) and Johns Hopkins University (subaward from $90 million ARO/ARL CRA) as well as a team of top experts in the growing field of peridynamics from the University of Arizona, Arizona State University, the University of Nebraska-Lincoln, and Columbia University (AFOSR MURI).

In the Fall of 2014 (my first semester at UT Austin), I brought together a group of five world class researchers, including several distinguished chair holders and/or full professors, and led as PI a proposal effort for a second MURI. Our team was down-selected from a preproposal stage of about 15 to be 1-of-3 invited to compete for the $6.5 million award. Ultimately, our proposal was scored well (see supplemental material), but not selected for funding. However, this effort and follow-up contacts with the program manager led to the single-PI ARO project shown in Table 2. The main reason for mentioning this is that it is rare for an assistant professor to attempt to lead or be competitive in a prestigious MURI proposal. This demonstrates the confidence my colleagues and the

Department of Defense (DOD) program managers have in my technical skill and leadership ability.

I am currently managing and providing funding for a group of 9 students. In the past I have supported as many as 10 students and 2 postdoctoral researchers.

My research encompasses all aspects of understanding how engineering materials fail, from the very small scale, e.g. molecular dynamics-to-continuum coupling, to the very large scale, e.g. hydraulic fracturing stimulation of horizontal wells in petroleum reservoirs. I have cultivated significant relationships with program managers at national laboratories, collaborators at major research universities, and members of industry, and am confident that my research portfolio will continue to grow.

Being formally trained as a mechanician, I have a very different background than a traditional petroleum engineer; however, it is my belief that this skill set adds tremendous value in a future where unconventional resources will play a large role in the petroleum industry. These unconventionals require extensive knowledge of geomechanics to efficiently and safely bring into production. They also require the coupling of geomechanics into traditional reservoir simulation which adds to the complexity and computational expense of already large simulations. My background in massively-parallel scientific computing and large-scale engineering simulations utilizing the worlds most sophisticated geomechanical constitutive models (I'm referring to my seven years spent as a staff member at Sandia National Laboratories and experience with constitutive models like Kayenta[1]) gives me a unique background to advance the applications of geomechanics in petroleum engineering.

While a great percentage of my time spent in academia thus far has been utilized writing proposals (27 proposals since August 2011 with 11 externally funded, 1 internally funded, and 1 pending), building laboratory capabilities and training students (which I had to do twice since I moved from UTSA and UT Austin), I have managed to continue to publish my research, as a single author, and with colleagues and students. I have published 22 papers in peer-reviewed journals (19 in rank), most of them in the best journals in solid and computational mechanics. One highlight of my scholarly activity was having the great honor to publish with the late Professor Ted Belytschko (National Academy of Engineering, National Academy of Sciences) a founder and world-renowned leader in the field of computational mechanics and finite element analysis. I am the first or corresponding author on the vast majority of my publications. In every case where I am not the first author, the names appearing before mine were students or postdocs with whom I worked closely. This signifies major individual contributions to all of these works on my part. I recently was an editor and chapter contributor on what will be the most extensive book published on the growing field related to the peridynamic theory of solid mechanics and nonlocal modeling (publication date will be November 11, 2016).

---

[1] Brannon, Rebecca, Fossum, Arlo and Strack. Eric "Kayenta: theory and user's guide." Sandia Report No. SAND2009-2282 (2009).

In my former career as a research scientist at Sandia National Laboratories I was involved in several areas of fundamental research: experimental, analytical, and computational. These efforts were often sensitive in nature and therefore could not be published in open literature, but are documented in internal technical reports at Sandia. My contributions to the area of penetration mechanics are well known to program managers and scientists within the Department of Energy (DOE)/DOD communities.

While I have a breadth of research expertise that encompasses both experimental and analytically modeling, it is my extensive experience and background in high-performance computing and large-scale computational simulation that puts me in position to make unique contributions in my field. For more than 10 years now, I have been a developer and analyst using some of the world's largest computers and massively parallel computational codes. I am currently the only developer outside of Sandia National Laboratories for the computational peridynamics code Peridigm. My code development activities, especially those involving open-source software, also serve to increase my expertise and reputation in my fields of research.

I have made peripheral contributions to several areas of mechanics, but I would classify my significant contributions in academic rank into three areas: high-strain rate material characterization and modeling, fundamental contributions to the theories and computational methods related to peridynamics and nonlocal modeling, and development of a new class of hydraulic fracture models. I will discuss the contributions and impact of my contributions in these areas in the following sections.

High strain rate material characterization and modeling. I brought to academia, from my PhD and career at Sandia, an expertise in using an experimental apparatus called a Kolsky bar. The Kolsky bar is used to test engineering, biological, and geo-materials undergoing high-strain rate loading (i.e. rapid deformation). Due to various physical phenomenon, most materials behave differently when loaded under these conditions. The typical effect is an apparent increase in material strength with increasing loading rate. During my PhD, I developed a new technique for characterizing a material's fracture toughness (i.e. a measure of a material's resistance to existing crack propagation) using a Kolsky bar (journal paper 20 on CV). Upon arriving at UTSA, I used my startup money to construct a world-class Kolsky bar system which has since been moved to UT Austin. A common modification to the Kolsky bar is to use a sacrificial pulse-shaper to tailor the input loading conditions for testing different materials. This is necessary to ensure that the material is tested, and therefore known and delineated for reporting purposes, at a constant strain-rate. For example, a material that strain-hardens under deformation will require the loading force to increase as the material strengthens in order for the strain-rate to be uniform for the majority of the test. Pulse-shaping techniques have been used in compressive and tensile Kolsky bars for several years. We developed a testing methodology to also incorporate pulse-shaping when testing materials in torsion (conference paper 4 on CV). Our most significant contributions in the area have been from the perspective of design-of-experiments. Designing pulse-shapers has mostly been a time-consuming trial-and-error effort in the laboratory. We developed a model and computational interface that can assist in designing pulse-shapers for both the testing of shock response of electronic

components with a Kolsky bar (journal paper 18 on CV) and for optimally designing pulse-shapers for testing at a given strain-rate in elastic-brittle materials (journal paper 15 on CV). I also wrote a brief technical note that derives new equations that are a useful check on the validity of the test conditions for Kolsky bar testing of elastic-brittle materials (journal paper 17 on CV). The significance of these contributions is when these models are employed, there is a great reduction in the trial-and-error time needed to get accurate test results for these classes of experiments. The Kolsky bar lab has since hosted visitors to perform material characterization experiments leading to forthcoming collaborative journal papers, and was quite active before being disassembled for the move to UT Austin. There has been some delay in progress while moving and reassembling the large equipment from UTSA to UT Austin, but the lab is once again operational. I have plans for follow-up proposals to my currently funded research with GE Global Research to begin testing shale samples in the Kolsky bar, i.e. it's part of a five-year plan that has been proposed which I have currently received the first-year funding increment. The obvious tie-back to petroleum engineering for this research is in drilling and perforations where high-strain strain-rate deformations occur.

Fundamental contributions to the theories and computational methods related to peridynamics and nonlocal modeling. Peridynamics is a reformulation of the classical conservation of momentum equations that seek to unify the mechanics of continuous media, media with evolving discontinuities, and particles. It is most notably used to solve mechanics problems where pervasive fracture and fragmentation of material and structures are part of the solution.

The theory was originally proposed in a restricted form in 2000 by my collaborator Dr. Stewart Silling at Sandia, with the seminal work and generalized theory appearing in 2007. I have been involved in research with the theory since 2005 and am considered by my peers as a leader and expert in the field. As a relatively new field, the community of researchers on peridynamics is small, but growing, which contributes to my overall lower total citation count. Within the community, I am one of the most highly cited researchers and have at least one of the most cited papers in the field (journal paper 21 on CV). It was the first paper to demonstrate using a sufficiently complex inelastic material constitutive model within the theory. Another significant paper which proposes the most generalized failure criterion within the theory (journal paper 19 on CV) has been on the front page of the respective journal[2] as a "most downloaded article" continuously since a few months after first appearing nearly 5 years ago!

The vast majority of my external funding is related to research activities that involve peridynamic theory. My AFOSR Young Investigator grant was to develop a new class of constitutive models for peridynamic beams and shells, i.e. lower degree-of-freedom models that still preserve the essential features of deformation in slender or thin structures while maintaining the essential feature of peridynamics—failure modeling. These models have

---

[2] http://www.begellhouse.com/journals/multiscale-computational-engineering.html

no analogue in the classical theory as they inherently resist rotation at the constitutive model level, and can be solved within the framework of the standard peridynamic momentum equation (in contrast to the fourth-order partial deferential equations (PDEs) introduced in the classical theory to model beams and shells). The theory developed in this research provides a generalized foundation for a new class of constitutive modeling that could potentially have implications in meta-materials modeling. This was the primary project of my first PhD student, Dr. James O'Grady, who jointly with me, published 3 papers on these topics (journal papers 1, 7, and 8 on CV). Dr. O'Grady is now a staff member at the Army Research Laboratory.

My AFOSR MURI grant encompasses many areas of peridynamics research including constitutive and computational model development. Under this grant, and in collaboration with two of the top researchers in computational mechanics, Professor Wing Kam Liu and the late Professor Ted Belytschko[3], we were able to show that for certain classes of constitutive models and particle discretizations, there is an equivalence in the discrete form between peridynamics and the well-established computational methods of element-free Galerkin (EFG) and reproducing-kernel particle methods (RKPM). In one respect, the significance of this was to solidify the theory of peridynamics in which some were still skeptical, including Professor Belytschko himself at one point in time. In another respect it showed that the EFG and RKPM methods, which claim to discretize the classical Cauchy momentum equation, in fact can be more correctly interpreted as discretizations of peridynamics. Both of these numerical schemes use a nonlocal kernel for interpolation which introduces characteristic length-scales, attenuation of forces-at-length, and physical wave-dispersion into the solution. These are features that do not appear in the local Cauchy continuum theory. Regarding computational peridynamics, we have also published other papers related to the efficiency of the assembly of tangent-stiffness matrices in the solution of quasi-static peridynamics mechanics problems. In this work, we also introduced a new computationally robust and efficient method of constructing tangent-stiffness matrices numerically by utilizing a complex variable technique (journal paper 10 on CV). In the interest of reproducible research, we published a companion repository of all the source code and scripts used to run the simulations and create the figures from this article[4]. Reproducible research is a subject I am passionate about and I plan to continue this practice when possible. We have also published several articles on computational multiscale techniques with peridynamics (journal papers 3, 4, 11, and 12 on CV) under this research program. The overarching goal of this MURI program is to rapidly bring computational peridynamics to a level of acceptance and widespread use that is equivalent to finite element methods that utilize the classical local theories. In order to encourage widespread adoption of the new developments from the MURI, we make every attempt to rapidly bring these new contributions to code users by developing the open-source software Peridigm in collaboration with researchers at Sandia National Laboratories. I am currently the only core developer outside Sandia and my students and I have made

---

[3] Notably, his last paper before his death.

[4] https://github.com/utsa-idl/Complex_Step_Jacobian_Project_Archive

numerous contributions to the code, which can be verified at the open-source repository on Github[5].

Finally, and closely related to the next section, using the mathematical tools developed for peridynamics, we have developed theories for nonlocal diffusion and transport in multiscale porous media (journal paper 14 on CV). These models are generalizations of the classical theory as they recover the classical single-phase pressure diffusivity equation as a special case, but they also can model anomalous transport processes and can recover fractional-Laplacian type models as a special case as well. As our goal at the time was to utilize the model for hydraulic fracture simulations to be developed in the future, we simply verified the model on large-scale continuum transport in porous media. Later, Tchelepi et al. at Stanford[6] cited our work and used a similar model to develop a nonlocal continuum theory that can be used to upscale pore-network models. This work was supported under the NETL program in collaboration with Professor Mukul Sharma (UT PGE), and extensions to advection-diffusion are being developed under the new ARO project and will be documented in journal publications under preparation.

A new class of hydraulic fracture models. In order to address a need for better hydraulic fracture models in shales and other unconventional resources where extreme fracture complexity brought about by the presence of natural fractures and other heterogeneities, Professor Sharma and I wrote a proposal and were awarded a grant from NETL to develop a hydraulic fracture modeling methodology and computational simulator based on peridynamic theory. We have accomplished this by first developing the previously discussed nonlocal diffusion theory and combining it with peridynamic solid mechanics for a theory that is a nonlocal variant of Biot poroelasticity (journal paper 6 on CV). We have verified the computational tools we have developed against several classical models for hydraulic fracturing under their restrictions and validated it against a series of experiments where hydraulic fractures interact with natural fractures under various reservoir conditions (conference paper 2 on CV). We have demonstrated the model in various complex and heterogeneous reservoir scenarios and have two additional and related journal articles in review. The new model has generated much interest in the hydraulic fracturing modeling community and I have given numerous invited talks on the subject. Professor Sharma and I hold joint group meetings weekly with the students working on this project, where I provide expertise in computational peridynamics, and Professor Sharma provides field scenarios and other reservoir physics expertise. This has been a strong and meaningful collaboration for me.

Future research vision. I see my future research vision broadly as two-fold. First, I will continue to enhance my reputation as a world-expert in peridynamics and non-local modeling by making fundamental contributions to the theory, developing open-source

---

[5] https://github.com/peridigm/peridigm/graphs/contributors

[6] Non-local formulation for multiscale flow in porous media. A.H. Delgoshaie, D.W. Meyer and P. Jenny and H.A. Tchelepi. Journal of Hydrology. **531** 649–654 (2015)

software, and promoting useful applications like the hydraulic fracture modeling discussed. The second part of the vision will require growth into new areas, but the mission is to bring new computational modeling techniques and high-performance computing to the forefront of earth science and energy production simulation. I have already begun some of this work by developing isogeometric analysis (IGA) techniques for reservoir simulation (conference paper 1 on CV), and have new collaborations in the works, e.g. with Professor van Oort on using IGA for drillstring dynamics simulations.

Table 1. Research Summary

Metric	**Value**
Peer-reviewed journal publications (***in rank*** and total)	19/22
Peer-reviewed conference proceedings (***in rank*** and total)	5/14
Number of ***journal*** papers in rank with UT (UTSA) students ***as co-authors***	3 (4)
Total citations of all publications (career) ***from ISI Web of Knowledge***	124
h-index (career) ***from ISI Web of Knowledge***	7
Total citations of all publications (career) ***from Google Scholar***	261
h-index (career) ***from Google Scholar***	9
Total external research funding raised	$10.29M
Total external research funding raised (candidate's share)	$2.4M
Total number of external grants/contracts awarded	11
Number of external grants/contracts awarded as PI	9

Table 2. External Grants and Contracts Awarded while in Rank

Role of Candidate and Co-Investigators†	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	Pulse Fracture Simulation	GE Global Research	$1ooK	$1ooK	2016
PI	Nonlocal and fractional order methods for near-wall turbulence, large-eddy simulation, and fluid–structure interaction	Army Research Office	$345K	$345K	2015-2018
PI	Fiber failure modeling with peridynamics	Army Research Laboratory/ Johns Hopkins University	$101K	$101K	2014
co-PI E. Madenci (PI) Arizona F. Bobaru (co-PI) Nebraska Q. Du (co-PI) Columbia N. Chawla (co-PI) Arizona St.	MURI Center for Material Failure Prediction Through Peridynamics	Air Force Office of Scientific Research	$7,500K	$959K	2015
PI	Predictive simulation of material failure using peridynamics-advanced constitutive modeling, verification, and validation	Air Force Office of Scientific Research	$360K	$360K	2013-2015
PI	Towards a multiscale failure modeling paradigm for polymers: statistical coarse-graining of molecular dynamics into peridynamics	Army Research Laboratory/ Johns Hopkins University	$92K	$92K	2013
PI	Peridynamic simulation of pressure-shear experiments on granular media	Sandia National Laboratories	$29K	$29K	2013
co-PI M. Sharma (PI) PGE Dept.	Fracture Design, Placement And Sequencing In Horizontal Wells	National Energy Technology Laboratory	$1,592K	$275K	2012–2016
PI	Statistical coarse-graining of molecular dynamics into peridynamics	Army Research Laboratory/ Johns Hopkins University	$92K	$92K	2013
PI	Peridynamic Simulation of Granular Materials Undergoing Shock Compression	Sandia National Laboratories	$33K	$33K	2012
PI	Sandia X-Prize Necking Challenge	Sandia National Laboratories	$45K	$45K	2012
TOTAL			**$10.3M**	**$2.4M**	

Relative contribution of grants listed as co-PI:

1. *MURI Center for Material Failure Prediction Through Peridynamics:* For this grant I am an equal share co-PI, the total funds were split equally among all 6 original PI's (there are 5 now due to one of the co-PI's taking a position overseas) save for some additional administrative funding provided to Madenci's group at Arizona. I authored approximately 35% of the original proposal and extensively edited the entire document with my co-PI's. I completely oversee my portion of the research

funds without oversight from the other co-PI's although we do collaborate loosely on certain tasks and work together to prepare progress reports and presentations.

2. *Fracture Design, Placement And Sequencing In Horizontal Wells:* For this grant I co-wrote the proposal with Dr. Sharma (UT-PGE) approximately splitting the duties equally. I provided most of the technical input regarding the proposed development of a hydraulic fracture model with peridynamic theory. This DOE proposal required a 20% cost share which came from Dr. Sharma's JIP on Hydraulic Fracturing and Sand Control, therefore a larger share of the overall funding was allocated to his portion of the effort. From the beginning of the project we have held joint meetings with the students and postdocs (1 postdoc and 2 students for Dr. Sharma and 2 students for my effort) and each served on the supervising committees of all the students involved. Every paper that has been published from this effort has been jointly published among Dr. Sharma, myself, and each of our students and postdocs.

John T. Foster

The University of Texas at Austin
computational mechanics, peridynamics, fracture mechanics, hydraulic fracturing
Verified email at austin.utexas.edu - Homepage

Follow

Google Scholar

Get my own profile

Citation Indices	All	Since 2011
Citations	275	261
h-index	9	9
i10-index	8	8

Co-authors View all...

Stewart Silling
Rezwanur Rahman, PhD
Mukul Sharma
Amit Katiyar
Miguel A. Bessa
Matt Bement
Harry Millwater
Brad L. Boyce
David Littlewood
Jake Ostien
John M Emery
Quoc P. Nguyen

Title 1–20	Cited by	Year
Viscoplasticity using peridynamics JT Foster, SA Silling, WW Chen International journal for numerical methods in engineering 81 (10), 1242-1258	77	2010
A meshfree unification: reproducing kernel peridynamics MA Bessa, JT Foster, T Belytschko, WK Liu Computational Mechanics 53 (6), 1251-1264	30	2014
A peridynamic formulation of pressure driven convective fluid transport in porous media A Katiyar, JT Foster, H Ouchi, MM Sharma Journal of Computational Physics 261, 209-229	21	2014
An energy based failure criterion for use with peridynamic states JT Foster, SA Silling, W Chen International Journal for Multiscale Computational Engineering 9 (6)	21	2011
Shock testing accelerometers with a Hopkinson pressure bar JT Foster, DJ Frew, MJ Forrestal, EE Nishida, W Chen International Journal of Impact Engineering 46, 56-61	15	2012
Peridynamic beams: a non-ordinary, state-based model J O'Grady, J Foster International Journal of Solids and Structures 51 (18), 3177-3183	14	2014
Peridynamic plates and flat shells: a non-ordinary, state-based model J O'Grady, J Foster International Journal of Solids and Structures 51 (25), 4572-4579	12	2014
Dynamic crack initiation toughness of 4340 steel at constant loading rates JT Foster, W Chen, VK Luk Engineering Fracture Mechanics 78 (6), 1284-1278	11	2011
Molecular dynamics simulation and characterization of graphene–cellulose nanocomposites R Rahman, JT Foster, A Haque The Journal of Physical Chemistry A 117 (25), 5344-5353	9	2013
Dynamic crack initiation toughness: Experiments and peridynamic modeling JT Foster DOI 10, 1001.000	9	2009
Modeling Loose Joints in Elastic Structures—Experimental Results and Validation JT Foster, AA Barhorst, CNS Wong, MT Bement Journal of Vibration and Control 15 (4), 549-565	8	2009
A Peridynamics model for the propagation of hydraulic fractures in heterogeneous, naturally fractured reservoirs H Ouchi, A Katiyar, J Foster, MM Sharma SPE Hydraulic Fracturing Technology Conference	7	2015
A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach H Ouchi, A Katiyar, J York, JT Foster, MM Sharma Computational Mechanics 55 (3), 561-576	6	2015
Comments on the validity of test conditions for Kolsky bar testing of elastic-brittle materials JT Foster Experimental mechanics 52 (9), 1559-1563	5	2012
A comparison of different methods for calculating tangent-stiffness matrices in a massively parallel computational peridynamics code MD Brothers, JT Foster, HR Millwater Computer Methods in Applied Mechanics and Engineering 279, 247—267	4	2014
A multiscale modeling scheme based on peridynamic theory R Rahman, JT Foster, A Haque International Journal for Multiscale Computational Engineering 12 (3)	4	2014
Constant strain rate testing of a G10 laminate composite through optimized Kolsky bar pulse shaping techniques EE Nishida, JT Foster, PE Briseno Journal of Composite Materials, 0021998312460263	4	2012
Dynamic Initiation Fracture Toughness of High Strength Steel Alloys. JT Foster, VK Luk, WW Chen, WW Chen Sandia National Laboratories Albuquerque, NM; Sandia National Laboratories ...	3	2008
Modeling and experimental verification of frictional contact-impact in loose bolted joint elastic structures JT Foster, AA Barhorst, CN Wong, MT Bement ASME 2005 International Design Engineering Technical Conferences and ...	3	2005
A Variationally Consistent Approach to Constrained Motion JT Foster Journal of Applied Mechanics 83 (5), 054501	2	2016

Show more

Dates and citation counts are estimated and are determined automatically by a computer program.

Change photo

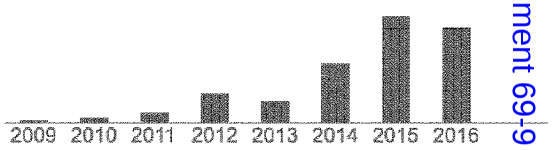
John T. Foster

Edit Follow

The University of Texas at Austin
computational mechanics, peridynamics, fracture mechanics, hydraulic fracturing
Verified email at austin.utexas.edu - Homepage
My profile is public

Google Scholar

Citation indices	All	Since 2011
Citations	261	247
h-index	9	9
i10-index	8	8



Title Add More 1–20 Cited by Year

Viscoplasticity using peridynamics JT Foster, SA Silling, WW Chen International journal for numerical methods in engineering 81 (10), 1242-1258	75	2010
A meshfree unification: reproducing kernel peridynamics MA Bessa, JT Foster, T Belytschko, WK Liu Computational Mechanics 53 (6), 1251-1264	28	2014
An energy based failure criterion for use with peridynamic states JT Foster, SA Silling, W Chen International Journal for Multiscale Computational Engineering 9 (6)	20	2011
A peridynamic formulation of pressure driven convective fluid transport in		

Co-authors Edit...

- Stewart Silling
- Rezwanur Rahman, PhD
- Mukul Sharma
- Amit Katiyar
- M.A. Bessa
- Harry Millwater

Foster, John T Get A Badge | ResearcherID Labs

Your labs page and badge show only your public data

Manage Profile | Preview Public Version

ResearcherID: K-5291-2016
Other Names: Foster, J. T.; Foster, John T.
E-mail: jfoster@austin.utexas.edu
URL: http://www.researcherid.com/rid/K-5291-2016
Subject: Enter a Subject
Keywords: Enter a Keyword
ORCID: http://orcid.org/0000-0002-7173-4728

Exchange Data With ORCID

My Institutions (more details)
Primary Institution: The University of Texas at Austin
Sub-org./Dept:
Role: Faculty
Joint Affiliation:
Sub-org./Dept:
Role:
Past Institutions:

Description: Enter a Description
My URLs:

My Publications

My Publications (24)
View Publications
Citation Metrics
Manage | Add

ResearcherID labs
Create A Badge
Collaboration Network
Citing Articles Network

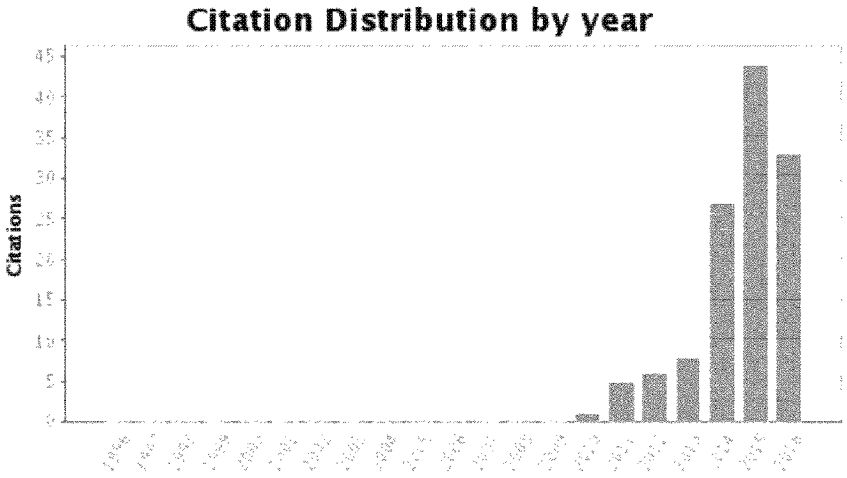
Publication Groups

Publication List 1 (0)
View Publications
Citation Metrics
Manage | Add

Publication List 2 (0)
View Publications

My Publications: Citation Metrics

This graph shows the number of times the articles on the publication list have been cited in each of the last 20 years.
Note: Only articles from Web of Science Core Collection with citation data are included in the calculations. More information about these data.



Total Articles in Publication List: **24**
Articles With Citation Data: **24**
Sum of the Times Cited: **124**
Average Citations per Article: **5.17**
h-index: **7**
Last Updated: **08/05/2016 02:47 GMT**

PGE Budget Council Statement
For
John Foster
Academic Advising, Counseling, and Other Student Services

Dr. Foster currently supervises 7 PhD students and 2 MS student. He supervises 7 of the students as a sole supervisor in the Department of Petroleum and Geosystems Engineering (PGE) while the other 2 students were co-supervised with another PGE faculty member. Another is an engineering mechanics student at UT that Dr. Foster was invited to co-supervise. As an assistant professor at UT San Antonio and Austin he has completed the supervision of 1 PhD student and 5 MS students. All of the students were funded by Dr. Foster's research program. Dr. Foster has also served on the supervisory committees for 2 students in the PGE department and was a reader for a MS thesis in the PGE department.

Dr. Foster meets on a weekly basis with his graduate students to review their research progress and also has monthly meetings with his students and members from the companies that sponsor his research activities. He seeks advice from the companies and provides opportunities to present their findings to the industrial partners. As a result of such meetings with industry members, some of Dr. Foster's students have had the opportunity to obtain summer internships in companies.

As a service to the graduate students at The University of Texas at Austin, he has served on the PGE Graduate Admissions Committee and the PGE Department Awards Committee. He has been involved in the PGE Undergraduate Studies Committee and the Cockrell School Engineering Honors Committee. Dr. Foster has a group of 4 undergraduates that participate in his research team. He also counsels undergraduate students in matters related to application for graduate programs as well as job opportunities and further career developments.

Dr. Foster maintains a blog for graduate students that contains various useful code snippets, examples, and resources primarily targeted at students and researchers working in scientific computation.

Concluding Remarks
The Budget Council Tenure and Promotion Committee has determined that Dr. Foster meets or exceeds all expectations for promotion. The PGE Budget Council Tenure and Promotion Committee, therefore, recommends without reservation his promotion to the rank of associate professor.

K. Sepehrnoori
Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee

Candidate's Statement on Advising, Counseling, and Other Student Services

John T. Foster, Ph.D., P.E.

Introduction. I find interacting with students outside of the classroom, both in a formal advisory setting as well as in informal roles, to be the most rewarding part of being a professor. The ability to observe and assist students in developing into independent researchers, thinkers, and problem solvers was a major motivating factor in my decision to leave Sandia National Laboratories and join academia in 2011. I view the students as the primary product of my research and teaching efforts, and I always treat them with the utmost respect. I make every effort to learn their names in class and take time to speak to them in the hallways of CPE. I am thrilled that my office is on the 3rd floor of CPE, just down the hall from the Caudle student center where I attempt to make daily walk-throughs to speak to the students. I have an open door approach to office hours, and inform the students in class that I hope they will all stop by and ask questions of both a technical and personal nature. I have supported and mentored both undergraduate and graduate students working in my laboratory as research assistants and in temporary assignments over summer sessions. Likewise, I have been faculty advisor for several student organizations. The tables below summarize my formal advising efforts. I will discuss the details of these endeavours in the following sections.

I'd also like to add that I seek out opportunities to promote and assist students. I have two graduate students currently working at summer internships that were brought-about through my research connections. I have helped my own graduate students and others on several occasions find work as summer interns at Sandia National Laboratories through my connections. I never hesitate to take the time to write strong letters of recommendations for students seeking employment or applying to graduate programs. I prepared the nominating package for Nkemakonam Egboga who was my TA in PGE 323M in Fall 2015 and he was awarded the William S. Livingston Outstanding Graduate Student Academic Employee Award by the Graduate Student Assembly. This award is given to one graduate teaching assistant in the entire university. Nkemakonam was the first PGE student and the first Cockrell School of Engineering student to ever be given this award.

Advising graduate students. Table 2 shows the details of the five graduate students that have completed their degrees under my direct and sole supervision. I provided financial support for them all throughout their entire programs, initially for two of the students with start-up money in my first year at UTSA, and then with grants from AFOSR, NETL, and Sandia National Laboratories (see Statement on Research).

Most notable is James O'Grady who was my first PhD student. He finished his degree in 3.5 years during which time we published 3 papers in some of the top journals in computational and solid mechanics. He is now a staff member at the Army Research

Laboratory. My goal for all PhD students is to publish at least 3 papers in good journals. I firmly believe that the role of a PhD advisor is to seed ideas and provide mentorship, but allow the students the creative freedom to develop their own research paths. The PhD degree to me is a sort-of certification or endorsement by the advisor, department, school, and university that the student has the skill-set required to do independent research. I require my PhD students to demonstrate this skill-set, and am committed to preserving the quality of the PhD programs I am involved with. Nevertheless, I encourage my students to move to the next phase of their careers when they have demonstrated their preparedness, and have no interest in holding back productive people to squeeze a little more out of them. The ideal PhD student in my mind is one in which the advisor's primary role is to simply tell them when they are finished. The single most rewarding accomplishment of my career in academia thus far was to watch James grow intellectually, to the extent that by the time he was finished, he could regularly teach me new things.

My goal for MS students is to publish at least one paper in a good journal. Michael Brother's MS thesis research resulted in a paper in arguably the best journal in computational mechanics (journal paper 10 on CV). While I've fallen short of that one paper goal in some cases, I believe all of the students' research that I have supervised is publishable, and in most cases we have manuscripts still in preparation held up by the student's departure. All of the MS students that I have supervised have done "thesis options", and have finished in appropriate time-scales for the required effort of a thesis (i.e. 1.5 - 2.5 years). They have all been encouraged and allowed to present their work at national and international conferences which I provided financial support to attend.

I currently supervise and provide funding for a group of nine students (see Table 3 in Statement on Teaching), seven of them as sole-advisor. All but two are PhD students and those two are likely to continue in the PhD program after completing their MS degrees. Jason York and Michael Brothers were both PhD students under my supervision at UTSA and decided to move with me to UT Austin. This has impeded their progress somewhat, requiring new courses and qualifying procedures, particularly in the case of Jason, who had already passed his qualifying exams at UTSA, and had to retake them at UT Austin (he has since passed). Jason is expected to do an oral proposal in the Fall of 2016 (at which time he will advance to PhD Candidacy), and will likely graduate in the Fall of 2017. He has already published a paper and has another in the final stage of preparation (awaiting my final edits) as of this writing. All of the other students I have met and begun supervision since coming to UT Austin. Sia Uppati and Eric Lynd will earn MS degrees in the Fall of 2016 (Eric is admitted as fastrack PhD).

Advising undergraduates. During my time in rank, I have sponsored four undergraduate research assistants working in my lab. The first, Eric Briseno developed a graphical user interface for some optimization tools I had written and we published a paper together (see journal paper 15 on CV) based on the methodology we developed for doing an a priori pulse-shaper design for Kolsky bar experiments (see Statement on Research). Robert Brothers worked on code maintenance issues and developed a new input system for the open source code we developed, Peridigm (see Statement on Research). His contributions have been permanently checked in to the code base. This can be verified on the

contributors page for the code at Github[1]. Jason Crandall helped translate a series of Mathematica notebooks and lectures I had previously prepared into what is developing into an open-source book on numerical methods[2]. Additionally, through my affiliation with the Institute for Computational Engineering and Science (ICES), I recently (Summer 2016) have mentored a Moncrief Summer intern, Sam Petzold. He learned to program in C++ with the deal.II finite element library, and we implemented a new constitutive model for the high-strain rate deformation of materials. His contributions will be added to a manuscript, as verification solutions for the new constitutive model, that we plan to submit to a journal.

Student organizations supervised. The following is a list of student organizations which I have served as primary advisor during my time in rank:

1. Programming for Engineers & Scientists 2016
2. Tau Beta Pi 2013-2014 (UTSA)
3. Formula SAE Car Team 2013-2014 (UTSA)

Table 1. Summary of Academic Advising

Metric	Value
Student organizations advised	3
Undergraduate researchers supervised	5
PhD students completed	1
MS students completed	5
PhD students in pipeline (as of 09/2016)	7
MS students in pipeline (as of 09/2016)	2

Table 2. Completed Graduate Students Supervised by Candidate

Student *Name*	Co-Supervisor	Degree	Start Date	Graduation Date	Placement
James O'Grady		PhD	8/2011	12/2014	Army Research Laboratory
Arron Werthiem		MS	8/2011	12/2012	KCI
Jason York		MS	8/2011	12/2012	PhD (UT-PGE)
Michael Brothers		MS	8/2012	12/2013	PhD (UT-EM)
Md. Imran Khan		MS	8/2012	12/2013	Global Vacuum Systems, Inc.
Amanda Peterson		MS	8/2012	5/2013	Engility

[1] https://github.com/peridigm/peridigm/graphs/contributors

[2] https://github.com/johntfoster/numerical_methods_book

PGE Budget Council Statement
For
John T. Foster

Service to the University and to the Nation, State and Community

This statement from the Budget Council reflects Dr. Foster's administrative committee service as well as his academic and professionally related public service.

Dr. Foster is an active participant in many of the departmental and college committees. Within the Petroleum and Geosystems Engineering Department, he serves on the undergraduate studies committee, the graduate admissions committee and the departmental awards committee. Each of these committees requires a significant commitment of time and effort. Dr. Foster has been an active and contributing member of each of these important assignments. In addition, Dr. Foster serves on the college of engineering honors committee. Dr. Foster expresses himself freely at faculty meetings and faculty retreats. His comments always add something useful to the discussion whether it is about faculty recruiting, teaching philosophies or student retention.

At the national and international levels, Dr. Foster has helped organize four international conferences and workshops and seven mini-symposia. He currently serves as the conference chair for the US National Congress on Computational Mechanics, a very well attended and prestigious international conference to be held in Austin. In the past, he has helped organize workshops related to mesh free methods in computational science and engineering as well as special symposia on multiscale modeling of dynamic material behavior. He was selected to serve as the Conference Chair of the US Association for Computational Mechanics (USACM) US National Congress on Computational Mechanics 15 (USNCCM 15). This is the flagship biennial meeting for USACM, and it very unusual for this responsibility to be placed on a young Assistant Professor. His service to the technical community is also reflected in his serving as a reviewer to no fewer than 12 journals.

In 2013, Dr. Foster was named by the San Antonio business journal as their annual '40 under 40' award winner. This award recognized his contribution in raising significant external research funding while at The University of Texas at San Antonio, as well as his outreach efforts to educate the general population about hydraulic fracturing activities in the Eagle Ford shale.

K. Sepehrnoori

Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee

Candidates Statement on Service to the University and to the Nation, State, and Community

John T. Foster, Ph.D., P.E.

Service to the PGE Department. Since coming to UT PGE, I have served on the following committees:

1. PGE Undergraduate Studies 2015-2016
2. PGE Graduate Admissions Committee 2015-2016
3. PGE Department Awards Committee 2014-2016

Additionally, I have participated in the preparing and grading of the math qualifying exam and have suggested and helped coordinate the visits of several seminar speakers. In general, I would say I am engaged in supplemental department activities at a level that only a few other PGE faculty members are. I try in earnest to attend events like the distinguished alumni dinner and alumni tailgate, freshmen retreat, SPE student chapter activities, lunches with invited speakers, graduate recruiting events (in PGE, ASE/EM, and for the ICES CSEM program), etc.

Departmental service at UTSA. I served on the following committees as a member of the Mechanical Engineering Department at UTSA:

1. Graduate Committee 2013-2014
2. Faculty Search Committee 2013-2014
3. Department Promotional Activities 2012-2013
4. Seminar 2011-2012

Service to the School and University. As an assistant professor, I haven't been called on very often to participate in committees above the department level, although I have served on the following committees:

1. Cockrell School Engineering Honors 2015-2016
2. Undergraduate Research Day Planning Committee 2013-2014 (UTSA)

Additionally, I participated in a panel discussion with the LEAD board, a group of about 20 young alumni who the Dean has working on critical projects related to the student experience.

Service to the Nation, State and Community. I have been fairly active in this area for an

assistant professor. As one of the leading experts in peridynamics research, which is a small group of people, I am often called upon to review articles. I have reviewed 1-2 papers a month for my entire time in rank. I have reviewed papers for the following journals: *Computational Geosciences, Journal of Applied Mechanics, Computational Methods in Applied Mechanics and Engineering, Journal of Computational Particle Mechanics, Journal of Microelectromechanical Systems, Computational Mechanics, International Journal of Fracture, Applied Mathematics & Computation, International Journal of Impact Engineering, Engineering Fracture Mechanics, Experimental Mechanics, Review of Scientific Instruments, International Journal of Multiscale Computational Engineering, International Journal of Solids and Structures, CMC: Computers, Materials, & Continua, Journal of Mechanics of Materials and Structures.*

I have served on a National Science Foundation (NSF) panel for the Mechanics of Materials program. I have reviewed proposals for the American Chemical Society's Petroleum Research Fund.

I have been very active in service within the computational mechanics community, serving as a member of American Society of Mechanical Engineers' (ASME's) Computational Mechanics Committee (CONCAM) as well as organizing several mini-symposia at the ASME annual conference and USACM biennial national congress. A list of notable minisymposia I had a significant role in organizing is given below:

1. Modeling of Material Failure Using Approaches Beyond Locality: A Celebration of Dr. Stewart Silling's 60th Birthday, *To be held* ASME IMECE2016
2. Advances in Galerkin and Collocation Meshfree Methods, WCCM 2016.
3. Corrosion Damage and Stress Corrosion Cracking: Experiments, Modeling, and Computations, ASME IMECE2015
4. Advances in nonlocal/peridynamic modeling: Symposia in honor of Dr. Stewart Silling's 55th birthday, ASME IMECE2012.
5. Multiscale methods and nonlocal theories for complex material behavior. USACM USNCCM12.
6. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2014.
7. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2013.
8. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2012.

More notably, I have organized several Thematic Workshops for the United States Association for Computational Mechanics (USACM), including the following:

1. Workshop on Isogeometric Analysis and Meshfree Methods
   - *To be held* at UCSD, October 10–12, 2016
   - http://iga-mf.usacm.org

2. Workshop on Meshfree Methods for Computational Science and Engineering
   - Held at UCF, October 27–28, 2014
   - http://mmlcse2014.usacm.org
3. Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal models.
   - Held at UTSA Downtown Campus, March 11–12, 2013
   - http://ndf2013.usacm.org

The most significant service is ongoing as I will be the **Congress Chair** for US National Congress on Computational Mechanics 15 (USNCCM 15) to be held in Austin, TX, July 28–August 1, 2019. Bringing this conference to Austin was a competitive process where a formal pre-proposal and proposal were written (completely by me, other than the budget for the proposal) and the voting members of USACM selected. Having this congress in Austin will bring significant continued recognition to UT Austin as the world-leader in computational mechanics. My early career service to USACM is likely unmatched among assistant professors in the US.

PGE Budget Council Statement
For
John Foster
Honors and Other Evidence of Merit or Recognition, Including Contracts and Grants

Dr. John Foster has been very successful at attracting research funding from various governmental sources and oil and gas companies. The total research funding he has brought in while at the University of Texas at San Antonio and Austin is $10.29 million. Of this, his share is $2.4 million. Most of these grants were awarded while he was at UT San Antonio. During his two years in Austin, while in rank as an assistant professor in the PGE department he has been able to attract over $463,927 dollars as his own share of funding. In addition, he is a participant on a Department of Energy (DOE) contract and is getting funding for two graduate students from the Joint Industry Project (JIP) on Hydraulic Fracturing and Sand Control. What is particularly impressive about his research funding is that he is raising funds from sources such as the Department of Defense (DOD) which have traditionally not been a source for funding for Petroleum Engineering faculty. In particular, he has received a $345,000 contract from the Army Research Office.

His technical expertise is highly valued among his peers and he has served as a reviewer for many journals including: Computational Geosciences, Journal of Applied Mechanics, Computational Methods in Applied Mechanics and Engineering, Journal of Computational Particle Mechanics, Journal of Microelectromechanical Systems, Computational Mechanics, Int. Journal of Fracture, Applied Mathematics & Computation, International Journal of Impact Engineering, Engineering Fracture Mechanics, Experimental Mechanics, Review of Scientific Instruments, International Journal of Multiscale Computational Engineering, International Journal of Solids and Structures, CMC: Computers, Materials, & Continua, Journal of Mechanics of Materials and Structures.

Dr. Foster has been particularly active in organizing highly regarded technical conferences and workshops, including:

1. Conference Chair, US National Congress on Computational Mechanics 15. To be held in Austin, TX, July 28-August 1, 2019.
2. Workshop on Isogeometric Analysis and Meshfree Methods, Sponsored by the US Association for Computational Mechanics. To be held at UCSD, October 10-12, 2016.
3. Workshop on Meshfree Methods for Computational Science and Engineering, Sponsored by the US Association for Computational Mechanics. Held at UCF, October 27-28, 2014.
4. Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal models, Sponsored by the US Association for Computational Mechanics. Held at UTSA Downtown Campus, March 11-12, 2013

He has also been responsible for organizing several important mini-symposia:

1. Modeling of Material Failure Using Approaches Beyond Locality: A Celebration of Dr. Stewart Silling's 60th Birthday, to be held ASME IMECE2016.

2. Corrosion Damage and Stress Corrosion Cracking: Experiments, Modeling, and Computations, ASME IMECE2015
3. Advances in nonlocal/peridynamic modeling: Symposia in honor of Dr. Stewart Silling's 55th birthday, ASME IMECE2012.
4. Multiscale methods and nonlocal theories for complex material behavior. USACM-USNCCM12.
5. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2014.
6. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2013.
7. Multiscale Modeling of Dynamic Material Behavior, SEM Annual Conference 2012.
8. The technical organizing committees for US National Congress on Computational Mechanics, ASME IMECE2015 and IMECE2016.

He has also presented many invited talks at technical meetings and universities worldwide.

He was recognized in 2015 by the Society of Petroleum Engineers with the Petroleum Engineering Innovative Teaching Award. He is also the recipient of the 2013 Young Investigator Award from the Air Force Office of Scientific Research. He is listed in the San Antonio Business Journal in the 40 under 40 list of successful young professionals.

Concluding Remarks
Based on an examination of the documents submitted, Dr. Foster's record meets or exceeds the requirements for those of an associate professor in PGE. The PGE Budget Council Tenure and Promotion Committee, therefore, fully supports his promotion to the rank of associate professor.

K. Sepehrnoori

Kamy Sepehrnoori, Chair
PGE Tenure and Promotion Committee

Candidate's Statement on Honors, and Other Evidence of Merit and Recognition, Including Contracts and Grants

John T. Foster, Ph.D., P.E.

Since becoming an assistant professor in the Fall of 2011, I have rapidly demonstrated an ability to acquire funding from multiple sources across a wide spectrum of fundamental research. I am a 2013 Air Force Office of Scientific Research (AFOSR) Young Investigator Awardee. In addition to AFOSR, I have received funding from Sandia National Laboratories (SNL), Army Research Laboratory, Army Research Office, The National Energy Technology Laboratory, and GE Global Research. I was an (equal share) co-PI for a prestigious Multidisciplinary University Research Initiative (MURI) award. With everything taken into account, I have been awarded over $2 million in funding for my research as PI and over $10 million as co-PI. I have been awarded these grants at both UTSA and UT Austin with several spanning my time at both universities.

In the Fall of 2015, I brought together a group of five world class researchers, most chaired and/or full professors, and lead as PI a proposal effort for a second MURI. Our team was down-selected from a prepropsal stage of about 15 to be 1-of-3 invited to compete for the $6.5 million award. Ultimately, our proposal was scored well, but not selected for funding. However, this effort and follow-up contacts with the program manager lead to the single-PI ARO project. The main reason for mentioning this is that it is virtually unheard of for an assistant professor to attempt to lead or be competitive in a prestigious MURI proposal. This demonstrates the confidence my colleagues and the Department of Defense (DOD) program managers have in my technical skill and leadership ability.

I have given numerous invited talks at universities, research centers, and conferences including places like the world-renowned engineering programs at Caltech and the University of Illinois (see CV for complete list).

I was recently selected after a competitive process to be the Conference Chair of the US Association for Computational Mechanics (USACM) US National Congress on Computational Mechanics 15 (USNCCM 15). As this is the flagship biennial meeting for USACM, it is an honor that the society placed the leadership of this congress in my hands, a responsibility not often bestowed on an assistant professor.

I was recently awarded the Society of Petroleum Engineers Faculty Innovative Teaching Award for 2015 in recognition of my use of technology in the classroom.

In 2013, I was named by the San Antonio business journal as on of their annual '40 under 40' award winners. This was given primarily for my recognition in raising significant external research funding while at UTSA, but also has a nice community service component to the competitive process that recognized some of the outreach efforts I had participated in regarding education on hydraulic fracturing activities in the Eagle-Ford Shale region.

A short summary of significant honors is:

- 2015 SPE Petroleum Engineering Innovative Teaching Award
- 2013 Air Force Office of Scientific Research Young Investigator Award
- 2013 '40 Under 40' - San Antonio Business Journal

LETTERS RECEIVED

A minimum of four review letters should be listed *alphabetically* with affiliation, etc.

Name of reviewer, rank or title, department, university	Brad Boyce, Distinguished Member of the Technical Staff, Sandia National Laboratories
Brief statement of expertise and reason for selection*	Computational mechanics expert from a national laboratory
Other relevant information**	
Nominated by	Candidate
Date letter received	July 22, 2016

Name of reviewer, rank or title, department, university	Lee Chin, Senior Fellow, Retired, ConocoPhillips Company
Brief statement of expertise and reason for selection*	Professional researcher, expert in geomechanics and hydraulic fracturing
Other relevant information**	
Nominated by	Budget Council
Date letter received	July 24, 2016

Name of reviewer, rank or title, department, university	Emmanuel Detournay, Professor, Department of Civil, Environmental, and Geo-Engineering, University of Minnesota
Brief statement of expertise and reason for selection*	Theoretical and computational mechanics expert experienced in hydraulic fracturing applications, peer institution
Other relevant information**	National Academy of Engineering
Nominated by	Budget Council
Date letter received	July 20, 2016

Name of reviewer, rank or title, department, university	C. Armando Duarte, Professor, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
Brief statement of expertise and reason for selection*	Respected computational mechanics expert at peer institution
Other relevant information**	UT-Austin graduate, Engineering Mechanics
Nominated by	Candidate
Date letter received	August 9, 2016

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Name of reviewer, rank or title, department, university	Derek Elsworth, Professor, Energy and Mineral Engineering, Geosciences and Civil Engineering, Penn State University
Brief statement of expertise and reason for selection*	Geomechanics expert in peer institution
Other relevant information**	National Academy of Engineering
Nominated by	Budget Council
Date letter received	July 21, 2016

Name of reviewer, rank or title, department, university	Ahmad Ghassemi, Professor, Petroleum Engineering, University of Oklahoma
Brief statement of expertise and reason for selection*	Numerical modeling expert experienced with poroelasticity and hydraulic fracturing, peer instituation
Other relevant information**	
Nominated by	Budget Council
Date letter received	August 16, 2016

Name of reviewer, rank or title, department, university	Peter Valko, Professor, Petroleum Engineering, Texas A&M Engineering
Brief statement of expertise and reason for selection*	Hydraulic fracture modeling expert and classical textbook author, peer institution
Other relevant information**	
Nominated by	Budget Council
Date letter received	July 28, 2016

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

DECLINATIONS

Those declining to provide a review letter should be listed *alphabetically* with affiliation, etc.

Name of reviewer, rank or title, department, university	Rick Dean, Senior Research Engineer, ConocoPhillips Company
Brief statement of expertise and reason for selection*	Expert in fracture
Other relevant information**	Member of UT's Center for Mechanics of Solids, Structures and Materials
Nominated by	Budget Council
Declination – date received and reason	June 20, 2016, said was not well read on the specialty of the candidate

Name of reviewer, rank or title, department, university	Stephen Holditch, Professor, Petroleum Engineering, Texas A&M University
Brief statement of expertise and reason for selection*	Expert in petroleum engineering with considerable experience in hydraulic fracturing
Other relevant information**	National Academy of Engineering
Nominated by	Budget Council
Declination – date received and reason	July 5, 2016; Lack of expertise in candidates discipline

Name of reviewer, rank or title, department, university	Michael Ortiz, Professor, Aeronautics and Mechanical Engineering, Caltech
Brief statement of expertise and reason for selection*	Expert in computational mechanics
Other relevant information**	National Academy of Engineering
Nominated by	Candidate
Declination – date received and reason	August 28, 2016, Lack of expertise.

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Name of reviewer, rank or title, department, university	John Rudnicki, Professor, Civil and Environmental Engineering, Northwestern University
Brief statement of expertise and reason for selection*	Geomechanics expert
Other relevant information**	National Academy of Engineering
Nominated by	Candidate
Declination – date received and reason	June 20, 2016, Lack of expertise in candidates discipline

Name of reviewer, rank or title, department, university	Mohamed Soliman, Department Chair, Petroleum Engineering, University of Houston
Brief statement of expertise and reason for selection*	Experienced in hydraulic fracturing and modeling
Other relevant information**	
Nominated by	Chairman
Declination – date received and reason	July 25, 2016, Feels not related to petroleum engineering

Name of reviewer, rank or title, department, university	Azra Tutuncu, Professor, Petroleum Engineering, Colorado School of Mines
Brief statement of expertise and reason for selection*	Specializes in rock mechanics applications in petroleum engineering, considerable industry experience working for Shell before moving to CSM
Other relevant information**	
Nominated by	Chairman
Declination – date received and reason	July 16, 2016, Lack of knowledge of candidate

Name of reviewer, rank or title, department, university	Mark Zoback, Professor, Geophysics, Stanford University
Brief statement of expertise and reason for selection*	Widely recognized geomechanics expert with experience in petroleum and other geo-applications
Other relevant information**	National Academy of Engineering
Nominated by	Candidate
Declination – date received and reason	July 12, 2016, On trek in Pamir Mountains, Tajikistan, and lack of familiarity with candidate.

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

NO RESPONSE

Those not responding to the request to provide a review letter should be listed *alphabetically* with affiliation, etc.

Name of reviewer, rank or title, department, university	Rod Clifton, Professor, Professor Emeritus, Engineering, Brown University
Brief statement of expertise and reason for selection*	Professor Clifton's primary research is on the mechanical response of materials at very high loading rates. Applications include: high speed machining, armor penetration, shear band formation, martensitic phase transformations, elastohydrodynamic lubrication, and dynamic fracture.
Other relevant information**	Pioneer in hydraulic fracture modeling in the 1980's, National Academy of Engineering
Nominated by	Candidate

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

DEPARTMENT OF PETROLEUM AND GEOSYSTEMS ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN
CPE 2.502 • Austin, Texas 78712 • (512) 471-3161 • Telefax (512) 471-9605

July 9, 2016

Dr. Brad Boyce
Distinguished Member of the Technical Staff
Sandia National Laboratories
blboyce@sandia.gov

Dear Dr. Boyce:

The Department of Petroleum & Geosystems Engineering at The University of Texas at Austin is considering Assistant Professor John Foster for tenure and for advancement in rank to the position of Associate Professor. We would appreciate your candid assessment of his scholarly contributions to assist our decision-making process. Excellent teaching is an important criterion for promotion, but our evaluation of teaching is being carried out separately, and we are asking you only for information about his scholarly distinction. Copies of Dr. Foster's curriculum vitae and several recent papers are enclosed for your review.

UT Austin normally considers a faculty member for promotion to associate professor upon completion of five years in probationary status. Dr. Foster had completed three years as an assistant professor at UT San Antonio prior to joining UT Austin in September 2014, completing five years as an assistant professor this spring. Therefore, this review is taking place at the normal time for tenure evaluation. Any comparisons with peers should be based on the years of service in probationary status (as an assistant professor), rather than the total years of post-doctoral service.

For Your Letter: First, please briefly describe your expertise and position. Then, we would appreciate your opinions regarding Dr. Foster's major engineering and/or scientific contributions. In preparing your assessment, please consider the following questions, as well as including any other factors you deem salient:

1. Do you know Dr. Foster, and if so, for how long and under what circumstances?
2. What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, you or others in your field?
3. How would you assess Dr. Foster's development compared with others in his cohort at research-intensive universities?
4. What is your perspective on Dr. Foster's promise for further professional growth and leadership?

The more specific you can be in your comments, the more helpful your evaluation will be.

Under the laws of the State of Texas, Dr. Foster has the right to request to see any materials in his personnel file, including your letter. Members of our faculty and internal review committees who see your letter as part of the promotion process will hold the comments you make in confidence, however.

Deadline: For your evaluation to receive full consideration, we would like to receive a signed letter from you by July 25, 2016. It is not necessary for you to send us a hard copy of your letter - an electronic or scanned version is sufficient, provided your institutional letterhead and your signature are included. In addition, please enclose a copy of a short version of your curriculum vitae or résumé (preferably no longer than two pages). If you have questions, please call me at the number given on the letterhead.

Thank you for your time and assistance with this important matter. As faculty members, we realize that the amount of time required to do a thoughtful review is considerable.

Sincerely,

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair

List of Materials Sent to Reviewers

John T. Foster

1. H. Ouchi, J.R. York, A. Katiyar, **J.T. Foster**, and M.M. Sharma. A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach. *Computational Mechanics*, 55(3):561–576, March 2015. doi:10.1007/s00466-015-1123-8.

2. A. Katiyar, **J.T. Foster**, H. Ouchi, and M.M. Sharma. A peridynamic formulation of pressure driven convective fluid transport in porous media. *Journal of Computational Physics*, 261:209–229, March 2014. doi:10.1016/j.jcp.2013.12.039.

3. J.T. O'Grady and **J.T. Foster**. Peridynamic plates and flat shells: A non-ordinary state-based model. *International Journal of Solids and Structures*, 51(25–26):4572–4579, 2014. doi:10.1016/j.ijsolstr.2014.09.003.

4. **J.T. Foster**, S.A. Silling, and W. Chen. An energy based failure criterion for use with peridynamic states. *International Journal of Multiscale Computational Engineering*, 9(6):675–688, 2011. doi:10.1615/IntJMultCompEng.2011002407.

5. **J.T. Foster**, S.A. Silling, and W.W. Chen. Viscoplasticity using peridynamics. *International Journal for Numerical Methods in Engineering*, 81(10):1242–1258, 2010. doi:10.1002/nme.2725.

C

Sandia National Laboratories
Operated for the U.S. Department of Energy by
Sandia Corporation

Albuquerque, New Mexico 87185-0889

date: July 22, 2016

to: Prof. Jon E. Olson and tenure/promotion evaluation committee

from: Brad L. Boyce, Distinguished Member of the Technical Staff, Sandia National Laboratories

Brad L Boyce

subject: Recommendation of Prof. John T. Foster for Tenure and Promotion to Associate Prof.

I am writing this letter to recommend Prof. John T. Foster for tenure and promotion to the Associate Professor rank in the Department of Petroleum & Geosystems Engineering at The University of Texas at Austin.

First, regarding my own background and qualifications, I have a PhD in Materials Science from the University of California at Berkeley. I hold the position of Distinguished Staff at Sandia National Laboratories in Albuquerque, NM, a special appointment restricted to <10% of the R&D scientists/engineers at Sandia. I am primarily known for my contributions at the intersection of experimental mechanics and material science- in this realm I have published >85 articles with an H-index of 28. I am also known for leading the "Sandia Fracture Challenge", a voluntary consortium involving 30+ institutions throughout the world (including Prof. K. Ravi Chandar at UT-Austin).

I have known John for more than 9 years, throughout his employment at UT-Austin, UT-San Antonio, Sandia National Laboratories and during his graduate studies at Purdue University. During John's early career at Purdue and Sandia, I observed his research efforts on several closely related projects at the lab. I am familiar with John's work in penetrator mechanics (intentionally unpublished for national security concerns), his graduate work on dynamic fracture, and some of his more recent work on the implementation and development of peridynamic computational methods. I have been consistently impressed with the level of quality of John's work, and his mastery of diverse subject matter.

While we never directly collaborated, my closest interaction with John came as I led a project on independent experimental validation of computational methods to predict ductile tearing. In spite of John's brief tenure at Sandia, he had already established himself as "the" internal expert on the application of peridynamics to problems in fracture. While Dr. Stewart Silling invented peridynamic theory at Sandia, it was clear that Stewart deferred to John with regard to how best to apply peridynamics to fracture of ductile metals. As an experimentalist, I found discussions with John to be a great learning opportunity- his mastery of peridynamic theory allowed him to convey the technique at any level, from the simplest conceptual level to the detailed mathematical derivations. Moreover, I found John's dual expertise with both computational and experimental methods to be a rare and powerful combination. He is simultaneously quite practical yet steeped in rigorous theory. When John left Sandia several years ago, he left a vacuum of expertise that has been difficult to replicate.

John has clearly demonstrated research prowess not only at a national lab, but in the academic environments of UT-San Antonio and UT-Austin. It has been a pleasure to watch John's impact broaden in recent years. For example, in recent years John has extended his expertise in Peridynamics into the realm of multiscale materials simulations – relevant to a national initiative in Integrative Computational Materials Engineering (ICME). Quantitatively, John has obtained 10 grants at an impressive 'hit-rate' of 40%, taught 7 different course topics, advised 18 graduate students, published 22 journal articles, edited a book and written a book chapter. These are accomplishments that seem commensurate with the tenure promotion. What is particularly telling is that at least two of John's major research projects come as a sub-investigator on a much larger effort: in those cases, top professors sought out John's capability as a clear 'rising star'.

They risked engaging a new professor at a mid-tier university because they were convinced that John would make a substantial technical contribution.

At Sandia, a promotion evaluation is of course used to reflect on an employee's performance but also to contemplate the opportunities for expanded impact in the new position. While this is intrinsically speculative, it is valuable to evaluate the employee's *potential*. In this regard, I believe that John's career trajectory has tremendous 'headroom'. It is exciting to learn about John's recent interactions with GE Global Research. Connections to industry in areas of relevance such as hydraulic fracturing are anticipated to lead to patentable economic impact. In this anticipated growth trajectory, John has strong entrepreneurial acumen that has been relatively untapped heretofore.

In summary, I unequivocally recommend Prof. John Foster for tenure and promotion – I am excited for John's continued growth in this next phase of his career.

Monday, September 12, 2016 at 2:35:38 PM Central Daylight Time

Subject: Fwd: [EXTERNAL] promotion letter request
Date: Friday, July 22, 2016 at 3:09:23 PM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

FYI.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

Begin forwarded message:

> **From:** "Boyce, Brad L" <blboyce@sandia.gov>
> **Date:** July 22, 2016 at 11:51:28 AM CDT
> **To:** "Olson, Jon" <jolson@austin.utexas.edu>
> **Subject: RE: [EXTERNAL] promotion letter request**
>
> Jon-
>
> Please find the requested promotion letter for John Foster and short CV attached.
>
> Cheers!
> Brad
>
> ~~~~~~
> Brad L. Boyce, Ph.D.
> Distinguished Member of the Technical Staff
> Sandia National Laboratories
> PO Box 5800, MS0889
> Albuquerque, NM 87185-0889
> ph: (505)845-7525
> fax: (505)844-7910
> cell: (505)366-3332
> e-mail: blboyce@sandia.gov
> ~~~~~~
>
> **From:** Olson, Jon [mailto:jolson@austin.utexas.edu]
> **Sent:** Saturday, July 09, 2016 4:45 PM
> **To:** Boyce, Brad L
> **Subject:** RE: [EXTERNAL] promotion letter request
>
> Thanks so much. I appreciate your help! -Jon
>
> Jon E. Olson, PhD, PE

Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin
512-471-7375

From: Boyce, Brad L [mailto:blboyce@sandia.gov]
Sent: Saturday, July 09, 2016 5:43 PM
To: Olson, Jon
Subject: Re: [EXTERNAL] promotion letter request

Happy to oblige.

-Brad

Brad L. Boyce, Ph.D.
Distinguished Member of the Technical Staff
Sandia National Laboratories
PO Box 5800, MS0889
Albuquerque, NM 87185-0889
ph: (505)845-7525
fax: (505)844-7910
cell: (505)366-3332
e-mail: blboyce@sandia.gov

On Jul 9, 2016, at 6:33 PM, Olson, Jon <jolson@austin.utexas.edu> wrote:

> Dear Dr. Boyce – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.
>
> The academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.
>
> Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 25.
>
> -Jon
>
> Link to Foster papers (too large to attach to email):
> https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0
>
> Hook 'em!
> Jon E. Olson, PhD, PE
> Chairman and Frank W. Jessen Professor
> Lois K. and Richard D. Folger Leadership Chair

Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

~~<Foster_CV_2016.pdf>~~
<Foster_Boyce.pdf>

Brad L. Boyce, Ph.D.

Sandia National Laboratories
P.O. Box 5800
Mailstop 0889
Albuquerque, NM 87185
(505)845-7525
blboyce@sandia.gov

EDUCATION

University of California at Berkeley
Ph.D. in Materials Science and Engineering, 2001 *summa cum laude* GPA: 3.93/4.00
Minors: Statistics and Mechanical Engineering
Thesis: *Understanding Impact-Induced Fatigue Failure*
Advisor: Prof. Robert O. Ritchie
Committee: Profs. R. Gronsky, C.K.H. Dharan, R.O. Ritchie
M.S. in Materials Science and Engineering, 1998
Thesis: *High Cycle Fatigue Thresholds in a Turbine Engine Titanium Alloy*
Advisor: Prof. Robert O. Ritchie
Committee: Profs. A.W. Thompson, J.W. Morris, C.K.H. Dharan, R.O. Ritchie
Michigan Technological University
B.S. in Metallurgical Engineering, 1996 *summa cum laude* GPA: 3.99/4.00

RESEARCH EXPERIENCE

Distinguished Member of the Technical Staff, *Sandia National Laboratories,* 2014 – present
(Special appointment, restricted to <10% of the Sandia technical staff)
Principal Member of the Technical Staff, *Sandia National Laboratories*, 2005 - 2014
Senior Member of the Technical Staff, *Sandia National Laboratories*, 2001 - 2005

- Five major research thrusts:
  - Materials selection and evaluation for structural applications.
  - Mechanisms of deformation, fracture, fatigue, and creep at the micro- and nano-scale.
  - Performance of microsystems, coatings, and small structures.
  - Material properties of soft biological tissues.
  - Product development, manufacturability assessment, component testing, failure analysis.
- Awarded grants from DOD, DARPA & various agencies within DOE.
- Internal consultant on numerous engineering programs from satellite systems to nuclear weapons.
- Inventor or co-inventor on 1 patent application and 6 technical advances
- >60 Invited lectures (partial list on pages 10-13) including department seminars at New Mexico Tech Univ., Univ. of New Mexico, Johns Hopkins Univ., Univ. of California at Berkeley, Univ. of California at Santa Barbara, Rice Univ., Univ.of Alabama at Tuscaloosa, Oregon State Univ., , Univ. of North Texas, North Carolina State Univ., Stevens Institute of Technology, ETH Zurich, École polytechnique fédérale de Lausanne, Helmholtz Zentrum Geestacht, Karlsruhe Institute of Technology, and Medtronic; and at professional society meetings such as MRS, TMS, ASM meetings, Gordon Research Conference.
- Materials mechanics lab owner: ~$4M in instruments, 3 technicians, 2 staff, 2 students, 70 projects/yr.

Visiting Scholar, *EMPA (Swiss Federal Materials Institute), Thun, Switzerland,* July-October, 2014.

- Primary research focus: room temperature creep and stress relaxation in nanocrystalline nickel.

Independent Consultant, *biomedical industry*, 2013.

- Failure analysis and prevention in single crystal silicon MEMS accelerometers.

PUBLICATION RECORD

- Published >85 peer-reviewed archival articles since 1999 on a wide range of topics in journals ranging from *Journal of Applied Physics* to *Acta Materialia* to *Journal of Biomechanics*. Over half of these articles were published since 2007.
- Those articles have been cited >2300 times. Citation H-index of 28 (based on Google Scholar).
- ResearchID ORCID 0000-0001-5994-1743,
- Published 20 peer-reviewed internal reports for Sandia National Laboratories.
- Most cited article in *International Journal of Fracture* for 2014
- Three review articles (topics: strength of silicon micro- and nano-systems, fatigue of nanocrystalline metals, slip in body centered cubic transition metals)
- Authorship awards: 2012 ASM Marcus A. Grossman Award & 2015 Cahn Prize Finalist

TEACHING EXPERIENCE

- Teaching Assistant for senior-level Undergraduate course at the University of California at Berkeley. Course title: "Mechanical Behavior of Materials", Fall 1997. Developed and graded homework/exams and taught 2-4 recitations/lectures per week.
- Taught short course on "Mechanical Properties of MEMS" at Society for Experimental Mechanics annual meeting, May 2009.
- Taught short course on "MEMS-Based Techniques for Nanomechanical Characterization" at TMS Annual Meeting, January 2009.
- Research mentor, advisor or thesis committee member for 6 B.S. students, 1 M.S. student, 2 Ph.D. students, 4 postdocs

HONORS & AWARDS, 2001-present

- Finalist, Cahn Prize, 2015
- DOE NNSA Defense Programs 'Award of Excellence', ARMS Product Realization Team, 2015
- Sandia 'Employee Recognition Award' for Predicting Performance Margins team (team lead), 2015
- Sandia 'Inventor' Award, 2014
- Gordon Conference 'Discussion Leader', 2014 topic: thin film and small scale mechanical behavior
- Sandia 'Distinguished Mentorship Award', 2013
- Selected for participation in the Emerging Leaders Alliance Program, 2013
- Gordon Research Conference Invited Presentation (area: thin film and small scale mechanics), 2012
- 2012 Marcus A. Grossman Young Author Award, society-level award for ASM
- Research highlighted in Sandia *'Lab News'* (May 2016), '*Lab Accomplishments*' monthly magazine (March 2011), and '*Science Matters*' brochure (March 2011)
- Nominated and selected for National Academy of Engineers' Frontiers of Engineering Symposium, 2010
- Sandia's LDRD Award of Excellence, 2010, (award included $50,000 research grant)
- TMS (materials professional society) Young Leader Award, 2008
- Metallurgical Transactions 'Excellent Review', 2001; 2010
- John and Fannie K. Hertz Foundation Fellowship, 1996 – 2001

SANDIA LEADERSHIP ACTIVITIES

- Area Lead, 'Born Qualified' Additive Manufacturing Grand Challenge LDRD ($4M/yr), 2015 -present
- Technical Lead, Engineering Materials Reliability Research Challenge, 2015-present
- Lead PI, Predicting Performance Margins program ($2.3M/yr), 2010-2015
- Lead PI, Nanomechanics and Nanometallurgy of Boundaries ($1M/yr), 2008-present
- Lead PI, Sandia Fracture Challenge (involving 30 institutions), 2009-present
- Strategy advisor for two Sandia Topical Areas: Materials Sciences and Engineering Sciences, 2014
- Board of Directors, Integrative Materials Design Consortium, 2014 - present
- Chair, Sandia National Laboratories Library Board, 2011 – present

EXTERNAL LEADERSHIP AND PROFESSIONAL SOCIETY ACTIVITIES

- Scientific Advisory Board for the International Conference on Fracture, 2013-present
- Chair TMS Mechanical Behavior committee, 2010-2012. Vice Chair, 2008-2009
- Member, TMS Programming committee, 2012-present
- Member, TMS Structural Materials Division Council and Awards committee, 2010-present
- Member, TMS Nanomechanical Behavior committee, 2005-present
- Member, MRS Intersociety Relations Committee, 2009-2010
- Member, ASTM Task Group on Fracture and Fatigue of MEMS Structures 2001-2002
- Key Reader, Metallurgical Transactions, 2005-2012
- Chapter President, ASM International Albuquerque Chapter, 2004 – 2005
- Reviewer for numerous technical journals including *Acta Materialia, Scripta Materialia, Biomaterials*
- Proposal peer reviewer for DOE (BES Early Career, SBIR) and NSF panel reviews.

July 24, 2016

Dr. Jon E. Olson
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair
Department of Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, Texas 78712

Dear Dr. Olson:

I am writing in response to your request for a letter to assess scholarly contributions of Dr. John Foster, who is being considered for tenure and for advancement in rank to the position of Associate Professor in the Department of Petroleum and Geosystems Engineering at The University of Texas at Austin.

I was Reservoir Engineering Fellow, retired from ConocoPhillips with 32+ years of industry experience in developing and applying numerical modeling technologies to evaluate, quantify, and resolve major field problems. My expertise is in the areas of geomechanics, coupled geomechanics and reservoir simulation, development of computer models and numerical simulators, and numerical modeling.

I don't know Dr. John Foster. However, I have been following his technical publications over the past 4 years because of his innovative research work in using peridynamics. Thus, I am familiar with his research on applying peridynamics for solving challenging and important problems associated with solid/fracture mechanics and fluid flow.

Based on Dr. Foster's research publications, I consider Dr. Foster to be one of the top experts in computational mechanics using peridynamics. His work in the area of constitutive modeling in solid mechanics, "Viscoplasticity using peridynamics" and "An Energy Based Failure Criterion For Use With Peridynamic States" have been excellent contributions in this subject matter. The new methods developed in these two papers permit us to predict deformation and failure behaviors of a rate-dependent plastic material even when cracks and other singularities appear in the field under loading. In the paper, "Peridynamic plates and flat shells: A non-ordinary, state-based model", Dr. Foster developed the first peridynamic material model to directly resist bending deformation. The model enables accurate modeling of plates with arbitrary Poisson's ratios and shows its potential to broaden the class of problems using peridynamics. The contribution of this work is very significant for predicting fracture propagation in plates and flat shells in a general manner.

Dr. Foster also has been involved in projects of coupling geomechanics and porous flow using a peridynamics approach. The research results were published in two papers, "A peridynamic formulation of pressure driven convective fluid transport in porous media" and "A fully coupled porous flow and geomechanics model for fluid driven cracks: a peridynamics approach". In this pioneering work, he formulated and developed a

peridynamic model that for the first time simulates poroelasticity and fluid-driven fracture propagation. This new model can simulate multiple, non-planar, competing fractures in unconventional reservoirs more realistically and will allow us to better design multi-stage hydraulic fracturing operations. This outstanding accomplishment provides us an alternative that will be practical and competitive compared to existing numerical methods (FDM, FEM, and BEM) for modeling hydraulic fracturing operations in the future.

In the area of computational mechanics with applications to geomechanics and fracture mechanics, I believe Dr. Foster is one of the best scholars/researchers compared with others in his cohort at research-intensive universities such as Stanford University, Texas A&M University, Colorado School of Mines, University of Oklahoma, and University of Calgary.

Based on his track records, his research interests in mechanics and multi-scale modeling with applications to geomechanics, fracture mechanics, and fluid flow, and his administrative and committee service activities, Dr. Foster will be very promising for further growth and leadership.

Based on Dr. Foster's significant contributions to innovation and advancement in the area of using peridynamics and his expertise in mechanics with applications to field problems, he is well deserving of promotion in rank to the position of Associate Professor in your esteemed department.

Best regards,

Lee Chin

Lee Chin, PhD, PE
Reservoir Engineering Fellow, Retired
ConocoPhillips Company
600 N. Dairy Ashford
Houston, TX 77079

Monday, September 12, 2016 at 2:27:54 PM Central Daylight Time

Subject: RE: promotion letter request
Date: Sunday, July 24, 2016 at 8:03:45 AM Central Daylight Time
From: lychin
To: Olson, Jon
CC: Stickney, Stephanie

Dear Dr. Olson,

As per your request, attached please find the promotion letter for evaluating Dr. Foster and a short version of my CV.

Please let me know if you need any additional information.

Best regards,

Lee

Lee Chin, PhD, PE
Email: chinly@comcast.net

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, July 15, 2016 4:13 PM
To: lychin
Cc: Stickney, Stephanie
Subject: Re: promotion letter request

Lee - Thanks so much. I look forward to receiving your letter.

- Jon

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

On Jul 15, 2016, at 3:42 PM, lychin <chinly@comcast.net> wrote:

> Dear Dr. Olson,
>
> As per your request, it is my pleasure to write a promotion letter evaluating Dr. Foster.
>
> Best Regards,
>
> Lee
>
> Lee Chin, PhD, PE
> Fellow, Retired
> ConocoPhillips
> E-mail: chinly@comcast.net

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, July 15, 2016 1:12 PM
To: chinly@comcast.net
Cc: Stickney, Stephanie; Olson, Jon
Subject: promotion letter request
Importance: High

Dear Dr. Chin – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

The academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 31, but if you need more time let me know and I will see if I can accommodate you. We would really like your input.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Full Name: Lee Chin

Title: Reservoir Engineering Fellow, Retired
Affiliation: Upstream Technology, ConocoPhillips Company

Education:

The Pennsylvania State University, University Park, PA, Ph.D. in Chemical Engineering, 1979
National Taiwan University, Taipei, Taiwan, M.S. in Chemical Engineering, 1973
National Taiwan University, Taipei, Taiwan, B.S. in Chemical Engineering, 1971

Professional Experience:

- Engineering Consulting (Mar. 2013-present)
- ConocoPhillips (Sept. 1980-Feb. 2013)
- Mobil Solar Energy Corporation (Feb. 1980-Sept. 1980)

Areas of Expertise:

- Geomechanics Simulation
- Coupled Geomechanics and Reservoir Simulation
- Subsidence and Reservoir Compaction Studies
- Large-scale, Full-field Numerical Simulation
- Finite-Element Modeling
- Numerical Simulator and Computer Model Development

License & Associations:

- Professional Engineer Oklahoma PE License #13016 (1982-present)
- Associate Editor for SPEJ (1999-2013)
- Member of SPE, AIChE, and ACS

Awards:

- 2009 SPE MID-CONTINENT NA REGIONAL TECHNICAL AWARD – Reservoir Description & Dynamics
- 2008 ConocoPhillips Canadian SPIRIT Award
- 2007 Mike Fetkovich Reservoir Engineering Technical Excellence Award

Publications:

- 14 refereed journal publications
- 28 refereed conference proceedings

BC

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Department of Civil, Environmental, and Geo- Engineering
College of Science and Engineering

500 Pillsbury Drive SE
Minneapolis, MN 55455
Office: 612-625-5522
Fax: 612-626-7750
www.cege.umn.edu

July 20, 2016

Professor Jon E. Olson
Chairman and Frank W. Jessen Professor
Department of Petroleum and Geosystems Engineering
The University of Texas at Austin
University of Southern California

Re: Evaluation of the P&T Case of Dr. John T. Foster

Dear Prof. Olson:

Upon review of the promotion and tenure file of Dr. John Foster, I am happy to provide unreserved support for his promotion to the rank of Associate Professor.

The detailed reasons that led me reach this recommendation are provided in my assessment of the publications that were sent to me and in my answers to the specific questions you asked me to address. Some of my comments would need to be filtered from the facts that Dr. Foster's area of expertise only partially overlaps with mine. The space in which Dr. Foster operates is in computational and experimental mechanics while mine is at the cross-roads of applied mechanics and petroleum geomechanics.

1. *Do you know Dr. Foster, and if so, for how long and under what circumstances?*

I met Dr. Foster only once in April 2015, on the occasion of a seminar I was giving at the Institute for Computational Engineering and Sciences. We chatted for about 1/2 h and Dr. Foster took this opportunity to share some of his research with me.

2. *What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, you or others in your field?*

As mentioned in the preamble of this letter, Dr. Foster and I operate in different spaces and therefore I do not have a detailed personal knowledge of his contributions, others than those apparent in the papers that were sent to me for evaluation. However, I have read these papers carefully (except Foster3 on plates and flat shells), and found them to be very well written and easily understandable. They are mostly published in high impact journals (in particular, JCP).

It is clear, from the reading of these contributions that Dr Foster has significantly contributed to the extension of the original peridynamics paradigm. While at Sandia, Dr Foster with coauthors Silling and Chen extended peridynamics to account for the propagation of cracks in an elastic solid (Foster 4), and for viscoplasticity (Foster 5). In more recent works done at UTSA, he developed with colleagues at UT a peridynamic formulation of transport phenomena driven by diffusion processes (Foster2) and a peridynamic approach to simulate fluid-driven cracks (Foster 1). In my view, Foster2 is a very significant paper, as the nonlocal fluid transport naturally built in the formulation is key to explain effects, such as scale-dependent dispersion. The modeling of hydraulic fractures described in Foster 1 builds on several years of Dr Foster's contributions to peridynamics.

After reading these papers, I very much appreciate the rigor of the approach, as well as the systematic effort of proving that the peridynamic formulation indeed degenerates gracefully to the appropriate classical (local) continuum model.

Extending the formulation of peridynamics to model various mechanical processes has been the focus of Dr Foster's research for several years. While there are other numerical contenders, peridynamics is an elegant and powerful approach to solve of broad range of problems and is most likely here to stay. I expect therefore that the contributions of Dr. Foster will have a lasting influence in the field.

3. How would you assess Dr Foster's development compared with others in his cohort at research-intensive universities?

Dr Foster compares very well with his peers in all the usual metrics. He has graduated 1PhD and 5 MSc students while at UTSA, and he is now advising an impressive number of graduate students at UT (9 with 1 co-advised); 8 out of 9 are PhD students, 3 of them having already passed their qualifying exams. He has also supervised 3 post-docs (at UTSA and at UT). His research is extremely well funded. Furthermore, as documented in his CV, Dr Foster has been very active in seeking funding from various organizations. Since graduating in 2009, Dr. Foster has published 22 papers in high-impact refereed journals (i.e., on average about 3/year, but 4/year since 2014). Most of the papers published in journals since 2014 have been co-authored by his students or post-docs. In summary, whether looking at students, grants, or papers, Dr Foster is performing extremely well. There is no question that he has "hit the ground running" since joining the UT system. Thus, I have no doubt that his promotion case would be reviewed favorably at any other research-intensive university and, in particular, at the UMN.

4. What is your perspective on Dr Foster's promise for further growth and significant contributions to his field.

Based on past performance and contributions, I believe that Dr. Foster's standing among his peers will continue to grow and that he will continue to assert himself as an expert in computational mechanics and multi-scale modeling with applications to various fields of mechanics.

Dr Foster has developed a vibrant research program at Austin. I foresee a bright future for him, with continued excellent contributions to computational mechanics. He has my undeserved support for his promotion to the position of Associate Professor at the University of Texas at Austin.

Emmanuel Detournay
Bennett Chair Professor

Monday, September 12, 2016 at 2:27:04 PM Central Daylight Time

Subject: FW: Reference letter for John Foster
Date: Tuesday, July 26, 2016 at 2:36:58 PM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

FYI.

Jon E. Olson
Chairman and Professor, Petroleum and Geosystems Engineering
512-471-7375

-----Original Message-----
From: Emmanuel Detournay [mailto:emmanuel.detournay@gmail.com]
Sent: Tuesday, July 26, 2016 1:21 PM
To: Olson, Jon
Subject: Reference letter for John Foster

Hi Jon,

Here is with a bit of delay my reference letter for John Foster.
Don't forget to let me about the seminar at the UMN.

Cheers

Emmanuel

Emmanuel Detournay

Professor
Member of the National Academy of Engineering

Contact Information:

- Office: CivE 168
- Phone: (612)625-3043
- Fax: (612)626-7750
- E-mail: detou001@tc.umn.edu

Research Interests:

Research interests revolve around the modeling of some geomechanical processes, such as hydraulic fracturing, drilling, rock-cutting and indentation; and on the mechanics of fluid-infiltrated geomaterials. Recent efforts on the modeling of hydraulic fractures have focused on: (1) the analysis of the singular behavior near the tip of an advancing fluid-driven fracture; (2) the study of poroelastic effects, caused by leak-off of the fracturing fluid in the permeable rock; and (3) the analysis of the initiation of hydraulic fractures at a borehole to improve the interpretation of the in-situ stress from a hydraulic fracturing stress test.

Current research on the cutting and indentation of rocks centers on analyzing the different modes of energy dissipation in these processes. The research aims at determining the conditions under which the mode of rock failure induced by the movement of a cutter or an indenter is "plastic" (crushing of the rock), "brittle"; (tensile fracture propagation), or "mixed".

Selected Publications:

Depouhon, A.; Denoël, V.; Detournay, E. 2015. Numerical simulation of percussive drilling. *International Journal for Numerical and Analytical Methods in Geomechanics* 39. 889-912.

Depouhon, A. and Detournay, E. 2014. Instability regimes and self-excited vibrations in deep drilling systems. *Journal of Sound and Vibration* 333. 2019-2039.

Buner, A.P.; Sarout, J.; Kear, J.; Piane, C.D.; Detournay, E.; Josh, M.; Dewhurst, D.N. 2014. Experimental chemoporoelastic characterization of shale using millimeter-scale specimens. *Journal of Petroleum Science and Engineering* 118. 40-51.

Depouhon, A.; Detournay, E.; Denoël, V. 2014. Event-driven integration of linear structural dynamics models under unilateral elastic constraints. *Computer Methods in Applied Mechanics and Engineering* 276. 312-340.

Huynen, A. and Detournay, E. 2014. A remark on the poroelastic center of dilation. *Journal of Elasticity* 116. 189-206.

Depouhon, A.; Detournay, E. ; Denoël, V. 2014. Accuracy of one-step integration schemes for damped/forced linear structural dynamics. *International Journal for Numerical Methods in Engineering* 99. 333-353.

Marck, J.; Detournay, E.; Kuesters, A.; Wingate, J. 2014. Analysis of spiraled borehole data using a novel directional drilling model. *SPE/IADC Drilling Conference, Proceedings* 2. 662-679.

Detournay, E. and Peirce, A.2014. On the moving boundary conditions for a hydraulic fracture. *International Journal of Engineering Science* 84. 147-155.

Marck, J. and Detournay, E. 2014. Perturbation to borehole trajectory across an interface. *48th US Rock Mechanics / Geomechanics Symposium 2014*. 349-354

Zhou, Yaneng and Detournay, E. 2014. Analysis of the contact forces on a blunt PDC bit. *48th US Rock Mechanics/ Geomechanics Symposium 2014*. 306-314.

Education:

- Ingenieur Civil, 1976, Mining Engineering, University of Liege, Belgium
- M.S.,1979, Geoengineering, University of Minnesota
- Ph.D., 1983, Geoengineering, University of Minnesota

Experience:

Senior Research Scientist, Schlumberger Cambridge Research, Cambridge UK, 1989-92 (Research Scientist, 1989)

MTS Visiting Associate Professor in geoengineering, Dept. of Civil and Mineral Engineering, Univ. of Minnesota, Fall Quarter 1990

Research Scientist, Dowell-Schlumberger, Tulsa, Oklahoma, 1985-88 (Senior Research Engineer, 1985)

C

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN
Department of Civil and Environmental Engineering

C. Armando Duarte
Professor and CEE Excellence Faculty Scholar
2122 Newmark Civil Engineering Laboratory, MC-250
205 North Mathews Avenue
Urbana, IL 61801-2352
e-mail: caduarte@illinois.edu
http://gfem.cee.illinois.edu/

August 9, 2016

Dr. Jon E. Olson
Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin

Re: Letter of Evaluation of Professor John T. Foster

Dear Professor Olson,

I write in response to your request for an assessment of Assistant Professor John Foster's credentials as part of his tenure and promotion evaluation at The University of Texas at Austin.

I hold a PhD in Engineering Mechanics from The University of Texas at Austin. I am a Professor at the Department of Civil and Environmental Engineering, and a faculty of the Computational Science and Engineering Program at the University of Illinois at Urbana-Champaign. I possess over 20 years of professional experience in the field of computational mechanics and computational methods like the Generalized or Extended Finite Element Method and meshfree methods. I also have five years of industrial experience. To date, I have published over 75 journal papers and book chapters, and co-edited two books on computational methods. My journal publications in computational mechanics and methods have been cited more than 4,850 times by other researchers in the field. Three of my journal papers have been listed among the most downloaded papers published by *Computer Methods in Applied Mechanics and Engineering* and *Computational Mechanics,* two of the most prestigious journals in the fields of computational methods and computational mechanics.

I first met Dr. Foster at the USACM Workshop for Meshfree Methods for Large-Scale Computational Science and Engineering, held in Tampa, FL, 2014. He was one of the plenary speakers at that workshop and gave an excellent talk on the simulation of fracture in plates and shells using peridynamics. It was clear from his presentation that he was doing leading research on peridynamics and extending the method to novel and exciting applications. His work appeared in a 2014 paper published in the *International Journal of Solids and Structures*, one of the top journals in solid mechanics. This paper already has been cited 12 times according to Google Scholar attesting the interest of the mechanics community on John's research.

Since that workshop, we have met at several major conferences on computational mechanics in the U.S. and Europe. I have attended several of his presentations at these conferences. I recall very well his excellent plenary lecture at Eighth International Workshop Meshfree Methods for Partial Differential Equations held in Bonn, Germany, last fall. He presented his work on multi-physics models for hydraulic fracture simulation and also recent fundamental theoretical advancement of the peridynamic theory of porous media fracture. His peridynamic model was, to my knowledge, the first to simulate poroelasticity and fluid-driven fracture propagation. Applications of his method include the simulation of hydraulic fracturing of oil and gas reservoirs. His work appeared in *Computational Mechanics*, a leading journal on computational methods.

Dr. Foster does research in the area of computational mechanics and multi-scale modeling with applications to geomechanics, impact mechanics, fracture mechanics, and transport processes. He has contributed significantly to the development of peridynamic models for solid mechanics, fluid flow in porous media and multi-physic problems such as hydraulic fracture simulations. These are research areas with important societal, environmental and economical implications. The exploration of oil and natural gas in shale reservoirs relies on extensive use of hydraulic fracturing. This technology has had a significant economic impact in the U.S. in the past decade. Yet, there are many open questions regarding the environmental impact of hydraulic fracturing which can potentially be addressed by computational simulations. Dr. Foster has been invited to presented his research at several international conferences such as the *U.S. National Congress on Computational Mechanics* and the *ASME International Mechanical Engineering Congress and Exposition*. He has secured substantial external funding for his research program. His level of funding is above the average for assistant professors.

I believe that a good way to assess the research potential of a faculty member at the start of their career is to look at their ability to branch out in different fields while building on the strength acquired during his/her graduate studies and/or post-doc. Dr. Foster has definitely demonstrated a remarkable ability to do just that by continuing his previous work in the area of computational methods (peridynamics) and solid mechanics and, at the same time, branching out to applications involving fluid flow and multi-physic phenomena.

Dr. Foster is very comparable in stature and development to the top young computational mechanics faculty at leading universities in the United States. More specifically, I rank him at a similar level to two recently promoted associated professors with research areas related to those of Dr. Foster: Dr. Haim Waisman, Associate Professor in the Department of Civil Engineering and Engineering Mechanics at Columbia University. He was promoted to associate professor in 2013 and his Google Scholar h-index was 13 in 2015; Dr. Caglar Oskay Associate Professor in the Department of Civil and Environmental Engineering at Vanderbilt University. His Google Scholar h-index was 11 in 2015. Dr. Foster's scholarship is also comparable with recently promoted associate professors at the College of Engineering at UIUC.

Dr. Foster's work has been published in high-impact peer-reviewed journals such as *Computer Methods in Applied Mechanics and Engineering, International Journal of Solids and Structures* and *Computational Mechanics.* Note that he or one of his students is the first author of most of the papers he has published, attesting his independence in conducting research in his field of expertise. Dr. Foster has a good citation record with over 265 citations and his h-index is 9, according to Google Scholar. This is quite remarkable since his academic career is still at

its early stages. I have no doubt that his level of excellence as a researcher and professional will continue in the years ahead. The quality and impact of Dr. Foster's research is also attested by invitations to deliver talks at several prestigious universities in the U.S., such as Northwestern University, the University of Illinois at Urbana-Champaign, the California Institute of Technology, among others.

I was pleased to review and offer an evaluation of Prof. John Foster's accomplishments. My recommendation, with enthusiasm, is to promote him to Associate Professor with indefinite tenure at the University of Texas at Austin. If I can provide any additional information that may be useful in Dr. Foster's assessment, please contact me.

Sincerely Yours,

C. Armando Duarte

C. Armando Duarte
Professor
Faculty: Civil and Environmental Engineering
Computational Science and Engineering

Monday, September 12, 2016 at 2:24:46 PM Central Daylight Time

Subject: Re: promotion letter request, UT-Austin
Date: Tuesday, August 9, 2016 at 2:43:39 PM Central Daylight Time
From: Armando Duarte
To: Olson, Jon
CC: Stickney, Stephanie

Dear Jon,

Please find attached my letter of evaluation of Dr. Foster and a short biography.
Best regards,
Armando

On 7/28/16 11:57 AM, Olson, Jon wrote:

> Hi Armando – We will be able to work with the 12th. Thank you. -Jon
>
> Jon E. Olson
> Chairman and Professor, Petroleum and Geosystems Engineering
> 512-471-7375
>
> ---
>
> **From:** Armando Duarte [mailto:caduarte2@gmail.com]
> **Sent:** Thursday, July 28, 2016 9:36 AM
> **To:** Olson, Jon
> **Cc:** Stickney, Stephanie
> **Subject:** Re: promotion letter request, UT-Austin
>
> Dear Jon,
> I will be glad to write a letter evaluating Dr. Foster. I will be in Korea until August 5th and won't be able to
> write an in-depth letter by August 8th. Would August 12th still work for you?
> Best regards,
> Armando
>
> On 7/28/16 5:37 AM, Olson, Jon wrote:
>
> > Armando – Sorry, there was a typo in my email I just sent you. The deadline I am hoping for is August 8, not July 15. The attachment pdf has the correct date. Thanks. I hope you can help. -Jon
> >
> > Jon E. Olson, PhD, PE
> > Chairman and Professor
> > Petroleum and Geosystems Engineering
> > The University of Texas at Austin
> > 512-471-7375
> >
> > ---
> >
> > **From:** Olson, Jon
> > **Sent:** Wednesday, July 27, 2016 3:36 PM
> > **To:** caduarte@illinois.edu
> > **Cc:** Stickney, Stephanie; Olson, Jon
> > **Subject:** promotion letter request, UT-Austin

Dear Dr. Duarte – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

The academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!
Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

--

C. Armando Duarte, Ph.D.
Professor and CEE Excellence Faculty Scholar
Dept. Civil and Environmental Engin.
2122 Newmark Laboratory MC 250
University of Illinois at Urbana-Champaign
205 North Mathews Av.
Urbana, Illinois 61801 USA
http://gfem.cee.illinois.edu/
https://www.youtube.com/channel/UC6wlfOnwRTYD0Tb_rfDTbTA

Recent papers:

- P. Gupta and C.A. Duarte. Coupled Formulation and Algorithms for the Simulation of Non-Planar Three-Dimensional Hydraulic Fractures Using the Generalized Finite Element Method. *International Journal for Numerical and Analytical Methods in Geomechanics*, 2015, accepted for publication.

- R.M. Lins, M.D.C. Ferreira, S.P.B. Proença and C.A. Duarte. An a-posteriori error estimator for linear elastic fracture mechanics using the stable generalized/extended finite element method. *Computational Mechanics*, 2015, accepted for publication.
- J. Kim and C.A. Duarte. A New Generalized Finite Element Method for Two-Scale Simulations of Propagating Cohesive Fractures in 3-D, *International Journal for Numerical Methods in Engineering*, 2015, accepted for publication.
- J.A. Plews and C.A. Duarte. Generalized Finite Element Approaches for Analysis of Localized Thermo-Structural Effects, *International Journal for Numerical Methods in Engineering*, 2015, accepted for publication.
- V. Gupta, C.A. Duarte, I. Babuska and U. Banerjee. Stable GFEM (SGFEM): Improved conditioning and accuracy of GFEM/XFEM for three-dimensional fracture mechanics. *Computer Methods in Applied Mechanics and Engineering*, 289:355-386, 2015.

"All truths are easy to understand once they are discovered; the point is to discover them." Galileo Galilei.

--

C. Armando Duarte, Ph.D.
Professor and CEE Excellence Faculty Scholar
Dept. Civil and Environmental Engin.
2122 Newmark Laboratory MC 250
University of Illinois at Urbana-Champaign
205 North Mathews Av.
Urbana, Illinois 61801 USA
http://gfem.cee.illinois.edu/
https://www.youtube.com/channel/UC6wlfOnwRTYD0Tb_rfDTbTA

Recent papers:

- P. Gupta and C.A. Duarte. Coupled Formulation and Algorithms for the Simulation of Non-Planar Three-Dimensional Hydraulic Fractures Using the Generalized Finite Element Method. *International Journal for Numerical and Analytical Methods in Geomechanics*, 2015, accepted for publication.
- R.M. Lins, M.D.C. Ferreira, S.P.B. Proença and C.A. Duarte. An a-posteriori error estimator for linear elastic fracture mechanics using the stable generalized/extended finite element method. *Computational Mechanics*, 2015, accepted for publication.
- J. Kim and C.A. Duarte. A New Generalized Finite Element Method for Two-Scale Simulations of Propagating Cohesive Fractures in 3-D, *International Journal for Numerical Methods in Engineering*, 2015, accepted for publication.
- J.A. Plews and C.A. Duarte. Generalized Finite Element Approaches for Analysis of Localized Thermo-Structural Effects, *International Journal for Numerical Methods in Engineering*, 2015, accepted for publication.
- V. Gupta, C.A. Duarte, I. Babuska and U. Banerjee. Stable GFEM (SGFEM): Improved conditioning and accuracy of GFEM/XFEM for three-dimensional fracture mechanics. *Computer Methods in Applied Mechanics and Engineering*, 289:355-386, 2015.

"All truths are easy to understand once they are discovered; the point is to discover them." Galileo Galilei.

C. ARMANDO DUARTE

Professor
CEE Excellence Faculty Scholar
Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign
205 N. Mathews Avenue, MC-250
Urbana, Illinois 61801-2352

Phone: +1-217-244-2830

e-mail: caduarte@illinois.edu
http://gfem.cee.illinois.edu/

Education

B.S., Mechanical Engineering, Federal University of Pernambuco, Brazil, 1988
M.S., Mechanical Environmental, Federal University of Santa Catarina, Brazil, 1991
Ph.D. Engineering Mechanics, The University of Texas at Austin, 1996

Professional Experience

2015–present, Professor, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
2010–2015, Associate Professor, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
2005–present, Faculty, Computational Science and Engineering, University of Illinois at Urbana-Champaign
2004–2010, Assistant Professor, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
2003–2004, Assistant Professor, Dept. of Mechanical Engineering, University of Alberta, Canada
2002, Visiting Professor, Dept. of Structural Engineering, School of Engineering, University of São Paulo, Brazil
1996–2001, Research Engineer, Altair Engineering, Inc., Austin, TX

Research Interests

Computational methods; solid and fracture mechanics; multi-scale and multi-physics problems; advanced scientific and parallel computing

Honors

2015, (inaugural) Raymond and Sidney Epstein Structural Engineering Faculty Award, Dept. of Civil and Environmental Eng., University of Illinois at Urbana-Champaign.
2015, Advisor of Piyush Gupta, winner of the Best Student Poster Competition at the 13th USNCCM.
2012—present, CEE Excellence Faculty Scholar, Dept. of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign.
2011, J.T. Oden Faculty Fellowship, Institute for Computational Engineering and Sciences, The University of Texas at Austin.
2007, Advisor of Jeronymo Pereira, winner of the Best Student Poster Competition at the 9th USNCCM.
2006—present, Faculty Fellow, National Center for Supercomputing Applications (NCSA)/UIUC.
2001, Young Researcher Award for Exemplary Research in Computational Mechanics from the first M.I.T. Conference on Computational Fluid and Solid Mechanics.

Representative Publications Duarte's journal papers have been cited more than 2,714 (4,886) times and his h-index is 19 (26), according to Scopus (Google Scholar).

1. J.A. Plews and C.A. Duarte. A two-scale generalized finite element approach for modeling localized thermoplasticity. *International Journal for Numerical Methods in Engineering*, accepted for publication, 2016. doi:10.1002/nme.5241.
2. P. Gupta and C.A. Duarte. Coupled Formulation and Algorithms for the Simulation of Non-Planar Three-Dimensional Hydraulic Fractures Using the Generalized Finite

Element Method. *International Journal for Numerical and Analytical Methods in Geomechanics,* 40(10):1402-1437, 2016. doi: 10.1002/nag.2485.

3. J.A. Plews and C.A. Duarte. Bridging Multiple Structural Scales with a Generalized Finite Element Method. *Intern. Journal for Numerical Methods in Engineering*, 102(3-4):180-201, 2015, doi:10.1002/nme.4703.
4. P. Gupta and C.A. Duarte. Simulation of Non-Planar Three-Dimensional Hydraulic Fracture Propagation. *International Journal for Numerical and Analytical Methods in Geomechanics*, 38:1397-1430, 2014.
5. V. Gupta, C.A. Duarte, I. Babuska and U. Banerjee. A Stable and Optimally Convergent Generalized FEM (SGFEM) for Linear Elastic Fracture Mechanics, *Computer Methods in Applied Mechanics and Engineering*, 266:23-39, 2013, doi:10.1016/j.cma.2013.07.010. This paper appeared in the list of top twenty-five most downloaded papers of Computer Methods in Applied Mechanics and Engineering.
6. V. Gupta, D.-J. Kim, and C.A. Duarte. Extensions of the Two-Scale Generalized Finite Element Method to Nonlinear Fracture Problems. *International Journal for Multiscale Computational Engineering*, 11(6):581-596, 2013.
7. D.-J. Kim, C.A. Duarte, and S.P. Proenca. A Generalized Finite Element Method with Global-Local Enrichment Functions for Confined Plasticity Problems. *Computational Mechanics*, 50(5):563-578, 2012, doi:10.1007/s00466-012-0689-7. This paper appeared in the list of top five most downloaded papers of *Computational Mechanics.*
8. P. Gupta, J.P. Pereira, D.-J. Kim, C.A. Duarte, and T. Eason. Analysis of Three-Dimensional Fracture Mechanics Problems: A Non-Intrusive Approach Using a Generalized Finite Element Method, *Engineering Fracture Mechanics*, 90:41-64, 2012. This paper was featured twice on the ScienceDirect Top 25 Hottest Articles.
9. D.-J. Kim, C.A. Duarte and N.A. Sobh. Parallel Simulations of Three-dimensional Cracks Using the Generalized Finite Element Method. *Computational Mechanics*, 47(3):265-282, 2010. This paper appeared in the list of top five most downloaded papers.
10. P. O'Hara, C.A. Duarte, T. Eason, and D.-J. Kim. Generalized Finite Element Analysis of Three-Dimensional Heat Transfer Problems Exhibiting Sharp Thermal Gradients. *Computer Methods in Applied Mechanics and Engineering*, 198(21—26):1857—1871, 2009. This paper was featured on the ScienceDirect Top 25 Hottest Articles.

Synergistic Activities (selected)

Conference co-organization: ECCOMAS Thematic Conference on Meshless Methods, Lisbon, Portugal, July 11-14, 2005.

Member of the Technical Advisory Board of the 9th US National Congress on Computational Mechanics (USNCCM), San Francisco, CA, July 22-26, 2007.

Workshop co-organization: Meshless Methods, Generalized Finite Element Methods and Related Approaches II, University of Maryland, March, 2009.

Chair of the United States Association for Computational Mechanics (USACM) Committee on Meshfree Methods, 2007-2009.

Member of the Scientific Committee of ECCOMAS Thematic Conference on the XFEM, GFEM and Fictitious Domain Methods: Recent Developments and Applications, Lyon, France, 2013.

Member of the Scientific Committee of the 2016 ASCE Engineering Mechanics Institute Conference (EMI 2016).

Member of the Scientific Committee of the 2016 USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, 2016.

Chair of the Technical Thrust Area on Novel Computational Methods in Engineering and Sciences, United States Association for Computational Mechanics (USACM): 2015-2017.

BC

PENNSTATE

John and Willie Leone Family Department of Energy and Mineral Engineering

College of Earth and Mineral Sciences
The Pennsylvania State University
110 Hosler Building
University Park, PA 16802-5000, USA

+1 814 865-2225
+1 814 865-3248 (Fax)

elsworth@psu.edu
www.ems.psu.edu/~elsworth/

July 21, 2016

Jon Olson
Chair, Petroleum and Geosystems Engineering
University of Texas, Austin

Dear Jon:

It is a pleasure to provide an evaluation of John Foster for tenure and promotion. I neither know the candidate nor recall being exposed to his work in the past – so this is truly a blind evaluation.

For context, I am a professor at Penn State where I have worked for ~30 years in the area of reservoir geomechanics with an emphasis on understanding the evolution of transport properties of fractured rocks. See: http://www.ems.psu.edu/~elsworth/

I will address the questions you pose.

Originality, Innovation and Contribution: John Foster is working in the generic area of computational mechanics with an emphasis on peridynamics and fracture – and now including applications involving fluids and geological media. His work in this area is at a high level with publications in reputable journals that I recognize (Int. J. Solids and Structures, Eng. Frac. Mechs., J. Comp. Phys A, Int. J. Num. Meth. in Engg.……) and covering a broad array of topics peripheral to his home (tenure) department, but with a realignment to the general area of reservoirs. A brief review of the papers shows then to be substantive – mainly modeling exercises completed at a high level – but with relatively fewer connections to actual observations that might drive such analyses. The latter is not a necessarily problem, just an observation. My sense is that these are significant contributions, adding to the capabilities to complete rapid and thoughtful analysis of the constraints on hydraulic fracturing, as one example. The candidate has made innovative contributions – the originality being in the application of peridynamics and mesh-free methods to a broad suite of problems.

Candidate's Standing: The candidate has received a number of awards – a significant number given his early career standing. An AFOSR young investigator award stands out among them, together with his clear engagement in arranging symposia and in the delivery of invited talks (some interpreted as job-talks) – but regardless impressive for someone at his current stage in his career. He is at or beyond the threshold of his peers at other research-one institutions.

Candidate's Promise: This is probably the strongest portion of his dossier – working at a relatively sophisticated and advanced level in the general area of computational mechanics, and although some of his topical choices are no doubt dictated by his prior (pre-PGE) engagement and interests at Sandia and otherwise, his potential to complete high-quality and profession-leading research is high. His strong mechanics background makes this a straightforward transition – no doubt his ability to ask the important

questions in his (new) discipline will evolve with his continuing engagement within his revised research trajectory.

In summary, the candidate has already made significant contributions to the literature in his original area of study (computational mechanics in general with an emphasis on peridynamics and mesh-free methods) and is redefining his research direction in closer alignment with his current position and interests. His success in this is apparent in his awards (AFOSR), funding (which is significant) and in publication in important journals in his field. He is certainly deserving of tenure and promotion in a research-one institution – which I support without reservation.

Please contact me if you have any further questions.

Yours sincerely,

Derek Elsworth

Derek Elsworth
Professor

Monday, September 12, 2016 at 2:30:16 PM Central Daylight Time

Subject: Fwd: promotion letter request
Date: Friday, July 22, 2016 at 3:09:49 PM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

FYI.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

Begin forwarded message:

> **From:** Derek Elsworth <elsworth@psu.edu>
> **Date:** July 21, 2016 at 3:26:06 PM CDT
> **To:** "Olson, Jon" <jolson@austin.utexas.edu>
> **Subject: Re: promotion letter request**
>
> Hi Jon,
>
> Hopefully this will suffice. He seems like an interesting guy.
>
> All the best.
>
> Derek

DEREK ELSWORTH
Professor, Energy and Mineral Engineering, Geosciences, Civil Engineering
The Pennsylvania State University, University Park, PA 16802
Phone: 814-865-2225, e-mail: elsworth@psu.edu

Education and Training:

Portsmouth Polytechnic, Portsmouth, UK, Engineering Geology, B.Sc. (1979)
Imperial College, London, UK, Engineering Rock Mechanics, M.Sc., DIC (1980)
University of California, Berkeley, Engineering, Ph.D. (1984)

Research and Professional Experience:

1997 - Pres.	Professor, Energy and Geo-Environmental Engineering, Pennsylvania State University.
2000 - 2003	Associate Dean for Research, College of Earth & Mineral Sciences, Penn State Univ.
1991 - 1997	Associate Professor, Mineral Engineering, Pennsylvania State University.
1985 - 1991	Assistant Professor, Mineral Engineering, Pennsylvania State University.
1990 - 1993	Adjunct Professor, Earth Sciences and WCGR, University of Waterloo.
1984 - 1984	Visiting Assistant Professor, Civil Engineering, University of Toronto.
1984	Research Associate, Lawrence Berkeley Laboratory.
1980 - 1982	Engineer D.R. Piteau and Assocs., and Komex Consultants. Calgary, Canada.

Relevant Publications Total peer-reviewed ~210, 1 authored and 2 edited books.

1. Guglielmi, Y., Elsworth, D., Cappa, F., Henry, P., Gout, C., Dick, P., Durand, J. (2015) In situ observations on the coupling between hydraulic diffusivity and displacements during fault reactivation in shales. J. Geophys. Res. Solid Earth, Vol. 120. http://dx.doi.org/10.1002/2015JB012158

2. Faoro, I., Elsworth, D., Candela, T. (2015) Evolution of the transport properties of fractures subject to thermally- and mechanically-activated mineral alteration and redistribution. Geofluids. http://dx.doi.org/10.1111/gfl.12157

3. Guglielmi, Y., Cappa, F., Avouac, J.-P., Henry, P., Elsworth, D. (2015) Seismicity triggered by fluid-injection-induced aseismic slip. Science. Vol. 348, pp. 1224-1226. http://dx.doi.org/10.1126/science.aab0476

4. Gan, Q., Elsworth, D. (2014) Analysis of fluid injection-induced fault reactivation and seismic slip in geothermal reservoirs. J. Geophys. Res. Vol. 119, No. 4, pp. 3340-3353. http://dx.doi.org/10.1002/2013JB010679.

5. Faoro, I., Vinciguerra, S., Marone, C., Elsworth, D., Schubnel, A. (2013) Linking permeability to crack density evolution in thermally stressed rocks under cyclic loading. Geophs. Res. Lett. Vol. 40, pp. 2590-2595. http://dx.doi.org/10.1002/grl.50436

6. Manga, M., Beresnev, I., Brodsky, E.E., Elkhoury, J.E., Elsworth, D., Ingebritsen, S.E., Mays, D.C., Wang, C.Y. (2012) Changes in permeability caused by transient stresses: field observations, experiments and mechanisms. Rev. Geophys., Vol. 50, No. 2, RG2004 http://dx.doi.org/10.1029/2011RG000382

7. Murdoch, L.C., Germanovich, L.N., Wang, H., Onstott, T.C., Elsworth, D., Stetler, L., Boutt, D. (2012) Hydrogeology in the vicinity of Homestake mine, South, Dakota, USA. J. Hydrol. Vol. 20, Vol. 1. pp. 27-43. http://dx.doi.org/10.1007/s10040-011-0773-7.

8. Taron, J. and Elsworth, D. (2010) Coupled mechanical and chemical processes in engineered geothermal reservoirs with dynamic permeability. Int. J. R. Mechs. Vol. 47, pp 1339 – 1348. doi:10.1016/j.ijrmms.2010.08.021

9. Min, K.-B., Rutqvist, J., and Elsworth, D. (2009) Chemically- and mechanically-mediated influences on the transport and mechanical characteristics of rock fractures. Int. J. R. Mechs. Vol. 46, No. 1, pp 80-89. http://dx.doi.org/10.1016/j.ijrmms.2008.04.002

10. Faoro, I., Niemeijer, A., Marone, C., and Elsworth, D. (2009) The influence of shear and deviatoric stress on the evolution of fractures in novaculite and diorite. J. Geophys. Res. Vol. 114, B01201, http://dx.doi.org/10:1029/2007JB005372

Synergistic Activities:

Recent Keynotes: [2016] Darcy Conference, Darcy Center, TU Eindhoven; Int. Conf. on Geomechs., Geoenergy and Georesources; 2nd Int. Conf. on Rock Dynamics. [2015] Int. Conference on Energy, Environment and Commercial Civilization; China Shale Gas 2015; CAE Science and Technology Forum; 7th Int. Conf. on Mining Sci. and Tech. [2014] Asian Rock Mechanics Symposium….

Recent Invited Presentations: [2016] NSF Workshop on Geotechnical Fundamentals in the Face of New World Challenges; [2015] NAE Symp on Earth Resources Engineering; CAE Science and Technology Forum; 7th Int. Conf. on Mining Sci. and Tech. [2014] Workshop on Unconventional THMC Processes, Chinese Academy of Sciences, Wuhan; Northeastern University (China); Harvard SEAS; ETH, Zurich; AGU. [2013] SPE/AAPG Regional Meeting; Chinese Academy of Sciences (Beijing & Wuhan); Tsinghua University; CUMT (Beijing and Xuzhou); JASON EGS Study; ARMA Unconventional Geomechanics Workshop; AGU.

Recently Convened Meetings: Convener ARMA-AAPG-SedHeat Workshop on "*Successful Engineering of Sedimentary Geothermal Systems.*" June 2016. Co-Convener Penrose Conference on "*Predicting and Detecting Natural and Induced Flow Paths for Geothermal Fluids in Deep Sedimentary Basins.*" October 2013.

Recent advisory activities: President ARMA Foundation (2014-). Department of Energy, Future of EGS Committee (2012-pres.). ARMA, Chair of Fellows (2011-). Department of Health and Human Services, Mine Health and Safety Research Committee (2011-2013). Department of Homeland Security, Geophysics Advisory Committee (2010). Chair, DUSEL Research Association Exec. Committee (2010). ARMA Fellow (2009). Chair, DUSEL Experiment Development Committee interfacing science experiments with the SURF facility (2008-2010).

Scientific Collaborators (previous 48 months)

M. Bai (GMI), E. Brodsky (UCSC), Z. Chen (UQ), L. Connell (CSIRO), P. Connolly (Chevron), C. Fairhurst (UM), I. Faoro (Durham), P. Flemings (UT), R. Foroozan (Golder), L. Germanovich (Georgia Tech), G. Gorman (Imperial College), Y. Guglielmi (LBNL), S. Ingebritsen (USGS), G. Izadi (Baker Hughes), K. Kishida (Kyoto), O. Kolditz (UFZ), D.S. Lee (Dong-A), L. Li (UQ), A. Linde (CIW), J. Liu (UWA), Y. Lu (CUMT-Xuzhou), M. Manga (UCB), P. Malin (Auckland), C. Marone (PSU), J. Mathews (PSU), G. Mattioli (UArkansas), T. McGuire (BP), L. Murdoch (Clemson), A. Niemeijer (Utrecht), T.C. Onstott (Princeton), Z. Pan (CSIRO), S. Pisupati (PSU), D. Pone (ConocoPhillips), M. Randolph (UWA), J.C. Roegiers (UO), J. Rutqvist (LBNL), D. Saffer (PSU), A. Schubnel (Paris), E. Shalev (Duke), E. Sonnenthal (LBNL), J. Taron (USGS), N. Tsuchiya (Tohoku), U. Turaga (ADI), D. vanEssendelft (NETL), S. Vinciguerra (INGV), B. Voight (PSU), S. Wang (Chevron), H. Yasuhara (Ehime U., Japan).

Graduate Students (M.S.~20; Ph.D.~17) and Postdocs (~11) (Since 2011 following)

Roozbeh Foroozan (Ph.D., 2011; Golder), Shugang Wang, (Ph.D. 2012; Chevron), Tom McGuire (Ph.D., 2012; BP), Ghazal Izadi (Ph.D., 2012; Baker Hughes), Baisehng Zheng (Ph.D., 20XX), Hemant Kumar (Ph.D., 2013; Chevron), Divya Chandra (M.S., 2012); Zhongwei Chen (Ph.D., UWA, 2012; U. Queensland), Rohan Belvalkar (M.S., 2011), Quan Gan (Ph.D., 2015), Taha Husain (Ph.D., 2015), Xiang Li (Ph.D. 2016), Yi Fang (Ph.D. 20XX); Thibault Candela (Postdoc; 2011-2014), Chaoyi Wang (Ph.D. 20XX), Kyunjae Im (M.S. 2015; Ph.D. 20XX), Sheng Zhi (M.S. 2015; Ph.D. 20XX), Brandon Schwartz (M.S. 20XX), Farnood Son Bidari (M.S. 20XX), Ziyan Li (M.S. 20XX).

Graduate Advisors: John W. Bray (Imperial College) and Richard E. Goodman (UC, Berkeley).

BC

MEWBOURNE SCHOOL of Petroleum & Geological Engineering
The University of Oklahoma

To Prof. Jon E. Olson, PhD, PE
Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin

August 14, 2016

RE: Dr. John T. Foster's Research Evaluation

I am writing this letter in response to your request to assess Dr. John T. Foster's research as part of your tenure and promotion process. Currently, I am the McCasland Chair Professor in the Department of Petroleum and Geological Engineering, The University of Oklahoma. Prior to this, I was the holder of the George and Joan Voneiff Development Professorship in Unconventional Resources at Texas A&M University where I developed the largest reservoir rock mechanics group in the United States, with more than 20 graduate students and two post-docs, all supported by research funds from federal agencies and industry. Before joining Texas A&M University, I was a tenured Associate Professor in the Department of Geology and Geological Engineering at the University of North Dakota. I have authored over 55 journal articles and 100 conference papers. I have been awarded the Geothermal Resources Council Special Achievement Award for my contributions to the modeling of coupled chemical-thermal-mechanical processes and rock-fluid interactions in geothermal reservoirs. I was on the organizing committee for the 50th U.S. Rock Mechanics Symposium. Currently, I am involved in reservoir geomechanics and hydraulic fracture modeling studies of petroleum and enhanced geothermal systems and I am directing the largest rock mechanics laboratory and research group in the U.S. at OU.

I do not know Dr. Foster on a personal basis but I am familiar with his work and his reputation in the computational aspects of hydraulic fracturing. Based on his record at both UTS and UTA, Dr. Foster has made excellent progress in establishing a computational fracturing research program that has yielded high quality journal publications. I am familiar with his work on developments in peridynamics to model fracture propagation in porous media. He has made significant contributions in extending this novel approach to fracture modeling and I am aware that a number of investigators have used his open-source codes. He has authored/co-authored at least 10 journal publications on the topic and related issues during his probationary years which is an excellent record. In addition, he has been the co-editor of a book on peridynamics and has 14 conference publications that provide good visibility.

Dr. Foster has mentored both graduate students and a post-doc and has been able to support them by external funding. He has 3 Ph.D. students near graduation and has supervised 5 Masters level students. This is very good considering he has changed institutions in 2014. Dr. Foster continues to develop proposals to attract funds to support his expanding research group.

He has a solid record of professional service which is culminating in chairing the U.S. Conference on Computation Mechanics in 2019. Dr. Foster has established himself as a major player in peridynamics for hydraulic fracturing. He is clearly well recognized for his contributions to numerical methods and computational mechanics and is on track for further professional growth and leadership. Dr. Foster has

been recognized by SPE for his innovative teaching and has been awarded the FOSR Young Investigator prize.

In summary, my review of Dr. Foster's record in the areas of research and service shows him to be a committed faculty member with significant contributions to the development and dissemination of knowledge through research and creative activities within the framework of a vigorous research program. Therefore, it is my view that he would certainly be granted tenure and promotion at a research-intensive university.

If you have any additional questions or need any clarifications, please contact me.

Sincerely,

Ahmad Ghassemi

McCasland Chair Professor
Mewbourne School of Petroleum & Geological Engineering
The University of Oklahoma
Sarkeys Energy Center, Office 1314
100 East Boyd Street
Norman, OK
Tel. (405)-325-4347
email: ahmad.ghassemi@ou.edu

Monday, September 12, 2016 at 2:20:56 PM Central Daylight Time

Subject: Re: promotion letter request
Date: Tuesday, August 16, 2016 at 11:33:47 AM Central Daylight Time
From: Ghassemi, Ahmad
To: Olson, Jon
CC: Stickney, Stephanie

Hello Jon

Sorry for the delay. Was delayed at the Denver airport yesterday. If you need my CV let me know.

AG

From: Olson, Jon <jolson@austin.utexas.edu>
Sent: Tuesday, August 9, 2016 4:12 PM
To: Ghassemi, Ahmad
Cc: Stickney, Stephanie
Subject: RE: promotion letter request

Hi Ahmad – I am checking in to see if you can still send a promotion letter for John Foster. Let me know. Thanks. Hope you have had a good summer. -Jon

Jon E. Olson, PhD, PE
Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin
512-471-7375

From: Olson, Jon
Sent: Friday, June 17, 2016 1:29 PM
To: ahmad.ghassemi@ou.edu
Cc: Stickney, Stephanie; Olson, Jon
Subject: promotion letter request

Hi Ahmad – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Ahmad Ghassemi

McCasland Chair Professor
E-mail: ahmad.ghassemi@ou.edu
Office: SEC 1314
Phone: 405-325-4347

Research Interests: Geomechanics applied to petroleum and geothermal reservoir development, Modeling of hydraulic fracturing and faulting, Reactive fluid flow in fractures, and constitutive modeling for chemically-active rocks

Education

B.Sc., Geological Engineering, University of Oklahoma
M.S., Engineering Geology, South Dakota School of Mines, 1988
M.S., Geomechanics, University of Minnesota, 1990
Ph.D., Geological Engineering, University of Oklahoma, 1996

Biography

Ahmad Ghassemi is the McCasland Chair Professor of Petroleum Engineering at the University of Oklahoma where he teaches Introduction to Rock Mechanics and Advanced Rock Mechanics I & II. He is the Director of The Halliburton Rock Mechanics Laboratory located in Sarkeys Energy Center room C-103. He is involved in the following projects:

- Hydraulic fracture propagation modeling, stimulated volume
- Experimental determination of reservoir rock properties
- Geothermal Energy Research
- Coupled geomechanics/fluid flow modeling: including naturally fractured & heavy oil reservoirs
- Poro-thermoelasticity
- Wellbore stability analysis, shale instability

Awards and Honors

- Geothermal Resources Council Special Achievement Award for outstanding contributions to the modeling of coupled chemical-thermal-mechanical processes and rock-fluid interactions in geothermal reservoirs
- Texas A&M University, College of Engineering William Keeler Faculty Fellow (2008-09)
- American Rock Mechanics Association M.S. Thesis of the Year Awarded to former student Andrew Nygren, 2006
- University of North Dakota College of Engineering & Mines Olson Professor, 2003-2004
- University of North Dakota Graduate School Summer Professorship Award, 1998, 2000

Professional Activities

- Editor-in-Chief, Geothermics(2010-2014).

- Panel Leader for the Geomechanics and Geochemistry working group in the Carbon Sequestration-Geothermal Energy Systems Geosciences Workshop, U.S. Department of Energy; June 15-16, 2010, Washington, DC.
- EPA Hydraulic Fracturing Technical Workshop Team Leader, Impacts of HF on Natural Transport Systems Washington DC., March, 27,2011.
- Discussion Leader for the Theory/Modeling Theme, DOE workshop on induced seismicity, Stanford University. Identify the critical issues for understanding and mitigation of induced seismicity.

Selected Publications

- Tarasovs, A. and Ghassemi, A. 2014. Self-similarity and scaling of thermal shock fractures. Physical Review E 90 (1), 012403-1-6.
- Sesetty, V. and Ghassemi, A. 2013. Numerical simulation of sequential and simultaneous hydraulic fracturing. In: Effective and Sustainable Hydraulic Fracturing. Edited by Andrew P. Bunger, John McLennan and Rob Jeffrey, ISBN 978-953-51-1137-5, Hard cover, 1000 pages, Publisher: InTech. Pp. 680-691.
- Ghassemi, A., and Rawal, A. 2013. Rock failure and micro-seismicity around hydraulic fractures. J. Pet. Sci. and Engrg. DOI information: 10.1016/j.petrol.2013.06.005.
- Verde, A., Ghassemi, A. 2013. Efficient solution of large-scale displacement discontinuity problems using the fast multi-pole method. Proc. 47th US Rock Mechanics/Geomechanics Symposium, San Francisco, USA.
- Huang, J., Ghassemi, A. 2013. Simulating geomechanical evolution of fractured shale reservoir using a poro-viscoelastic constitutive model. Proc. 47th US Rock Mechanics/Geomechanics Symposium, San Francisco, USA.

BC

Harold Vance Department of
PETROLEUM ENGINEERING
TEXAS A&M UNIVERSITY

Peter P. Valkó, Professor, R. Whiting Chair
office: 709 Richardson Building
phone: (USA) (979) 862-2757
e-mail: p-valko@tamu.edu

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
The Lois and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin

Re: Review for Dr. J. Foster

Date: 7/28/2016

Dear Jon,

It is my pleasure to provide feedback regarding the promotion material for Dr. Foster. In the following, I briefly describe my expertise and position, then I address the specific questions raised in Your letter.

0) (*about myself*) My research interests include design and evaluation of hydraulic fracture treatments, performance of stimulated wells and numerical Laplace transform inversion. I am professor and holder of the Robert Whiting Chair in Petroleum Engineering at Texas A&M University.

1) (*nature and duration of our relationship*) I do not know Dr. John Foster personally but I have seen some of his publications before.

2) (*research and publications: originality, significance, quantity and impact*) As a PhD student in Aeronautics & Astronautics, he focused on the applications and further development of a relatively new and innovative computational mechanics method (peridynamics). Joining The University of Texas (first at San Antonio and then at Austin) he widened his interest to material science in general, and lately he has been considering geo-mechanics (petroleum engineering) applications.

There are many approaches to computational mechanics, and when a newer approach is developed, every new application needs a lot of adaptation work. The pioneers of the new approach have to show deeper understanding of basic concepts while "translating" them to the new "language". It is a pleasure to read the various suggestions in Dr. Foster's papers, for instance regarding how fracture propagation or Darcy's law are handled in peridynamics. The publications show deep understanding of solid and fluid mechanics as well as abundant creativity.

The amount of his peer-reviewed publications is quite impressive, but what is even more important, he managed to place them in highly respected journals with outstanding impact factor (such as the *Journal of Computational Physics* and *Engineering Fracture Mechanics* to mention only two.) This fact makes Dr. Foster an exceptionally successful young researcher, no matter if we consider a traditional discipline with long history or we select the base for comparison in any other reasonable way.

According to SCOPUS, (see Fig. 1) his publication output keeps on increasing (with 2014 being and outstanding year.)

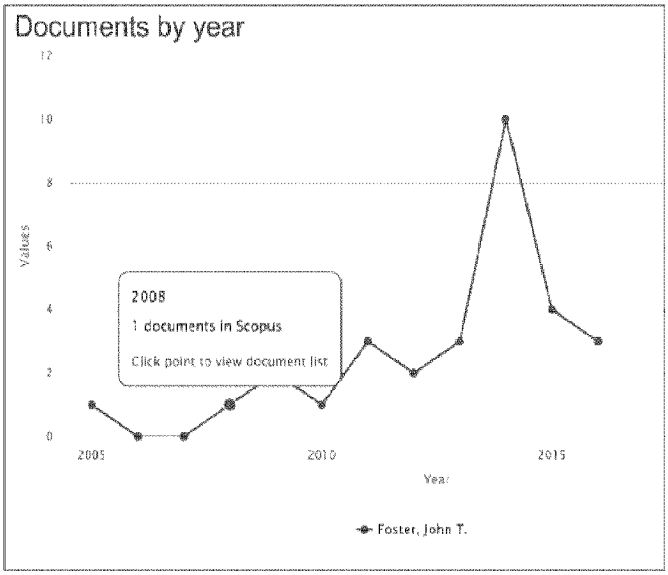


Fig. 1 Dr. Foster's publications per year according to Scopus (on 7/27/2016)

To assess the impact I used Google Scholar and found 5 publications above 15 citations (Table 1). This is a reasonable good result considering the author's age but the numbers are somewhat smaller than I anticipated.

Table 1. Citation counts in Google Scholar (on 7/27/2016)

Publication	Cited by
Viscoplasticity using peridynamics. 2010 JT Foster, SA Silling, WW Chen International journal for numerical methods in engineering 81 (10), 1242-1258	73
A meshfree unification: reproducing kernel peridynamics, 2014 MA Bessa, JT Foster, T Belytschko, WK Liu Computational Mechanics 53 (6), 1251-1264.	26
A peridynamic formulation of pressure driven convective fluid transport in porous media, 2014 A Katiyar, JT Foster, H Ouchi, MM Sharma Journal of Computational Physics 261, 209-229.	19
An energy based failure criterion for use with peridynamic states,2011 JT Foster, SA Silling, W Chen International Journal for Multiscale Computational Engineering 9 (6)	19
Shock testing accelerometers with a Hopkinson pressure bar, 2012 JT Foster, DJ Frew, MJ Forrestal, EE Nishida, W Chen International Journal of Impact Engineering 46, 56-61.	15

Of course a researcher's overall impact cannot be measured only by numbers of citations. Also, impact-factor weighted statistics would work toward Dr. Foster's advantage. Nevertheless, the data may suggest that focusing on method development provides less "instant gratification". A talented young researcher, like Dr. Foster, needs to respond to various

Department of Petroleum Engineering, 3116 TAMU, College Station, Texas 77843-3116, USA
(979) 845-2241 – FAX (979) 862-6579 – http://www.pe.tamu.edu

practical challenges to secure enough influence in a wider circle of experts. I am glad to see that he grabs all opportunities (handbook editing, conference talks, technical presentations) to make a larger impact.

3. (*comparison with others in his cohort at research-intensive universities*) Based on the amount and quality of the publications I have no doubt that Dr. Foster would be promoted to the ranks of associate professor at any research-intensive university.

4. (*further professional growth and leadership*) I have already touched upon this subject. Dr. Foster has great potential and it seems to me he is making the right strategic decisions at this point of his career.

Based on the material supplied to me, I fully support granting the rank of associate professor to Dr. Foster. I am convinced that he will continue to grow and flourish as a valuable faculty member.

Sincerely,

Peter P. Valkó

Department of Petroleum Engineering, 3116 TAMU, College Station, Texas 77843-3116, USA
(979) 845-2241 – FAX (979) 862-6579 – http://www.pe.tamu.edu

Monday, September 12, 2016 at 2:25:34 PM Central Daylight Time

Subject: FW: promotion letter request
Date: Thursday, July 28, 2016 at 1:56:19 PM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

FYI.

Jon E. Olson
Chairman and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Valko, Peter P [mailto:p-valko@tamu.edu]
Sent: Thursday, July 28, 2016 1:40 PM
To: Olson, Jon
Subject: RE: promotion letter request

Jon,
I am sending the promotion letter as a pdf file.
Please let me know if you also need a paper version.
Best Regards,
Peter

Peter P. Valko, professor
Department of Petroleum Engineering, Texas A&M University
office: 709 Richardson Building (corner of Spence and Ross Streets)
mail: 3116 TAMU, College Station TX 77843-3116 (USA)
phone: (USA)-(979)-862-2757
web: http://www.pe.tamu.edu/valko/public_html/
email: p-valko@tamu.edu

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, July 15, 2016 7:29 PM
To: Valko, Peter P <p-valko@tamu.edu>
Subject: Re: promotion letter request

Hi Peter - Thanks so much! I hope all is well in College Station. - Jon

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

On Jul 15, 2016, at 6:38 PM, Valko, Peter P <p-valko@tamu.edu> wrote:

> Jon,
> I am willing to do the evaluation within the stated deadline.
> Regards,
> Peter

Peter P. Valko, professor
Department of Petroleum Engineering, Texas A&M University
office: 709 Richardson Building (corner of Spence and Ross Streets)
mail: 3116 TAMU, College Station TX 77843-3116 (USA)
phone: (USA)-(979)-862-2757
web: http://www.pe.tamu.edu/valko/public_html/
email: p-valko@tamu.edu

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, July 15, 2016 1:15 PM
To: Valko, Peter P <p-valko@tamu.edu>
Cc: Stickney, Stephanie <stickney@austin.utexas.edu>; Olson, John <jolson@austin.utexas.edu>
Subject: promotion letter request
Importance: High

Hi Peter – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 31, but if you need more time let me know and I will see if I can accommodate you. We would really like your input.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!
Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Peter Valkó

Professor

Robert L. Whiting Chair in Petroleum Engineering

Office: RICH 709
Phone: 979.862.2757
Fax: 979.862.1272
Email: p-valko@tamu.edu

Research Website
Curriculum Vitae
Google Scholar Profile

Research Interests

- Performance of stimulated wells
- Design and analysis of hydraulic fracturing treatments
- Numerical inversion of the Laplace transform

Education

- PhD equivalent (Candidate of Sciences), Institute of Catalysis , Novosibirsk , USSR , 1981
- MS equivalent (Doctor technicus, Applied Mathematics) Veszprem University , Hungary , 1975
- BS equivalent (Dipl. chemical engineer), Veszprem University , Hungary , 1973

Selected Publications

Spivey, J.P., Valkó, P.P., and William. D. McCain, Jr. Applications of the Coefficient of Isothermal Compressibility to Various Reservoir Situations With New Correlations for Each Situation, SPE Reservoir Evaluation & Engineering, accepted for publication 2007.

Ilk, D., Valkó, P.P., and Blasingame, T.A. Deconvolution of Variable-Rate Reservoir-Performance Data Using B-Splines, SPE Reservoir Evaluation & Engineering, vol 9, 2006, pp 582-595.

Ibragimov, A., Khalmanova, D., Valkó, P.P., Walton, J.R. On a mathematical model of the productivity index of a well from reservoir engineering, SIAM J. Appl. Math, Vol 65 (Iss 6) 2005 pp 1952-1980.

Yi, X., Valkó, P.P., Russell, J. Effect of Rock Strength Criterion on the Predicted Onset of Sand Production, Int. J. Geomechanics, Vol 5 (Iss 1) 2005 pp 66-73.

Valkó, P.P. Solution of the Graetz–Brinkman problem with the Laplace transform Galerkin method, Int. J. Heat Mass Transfer, Vol. 48 (Iss. 9) 2005 pp. 1874-1882.

Valkó, P.P. and Abate, J. Numerical inversion of 2-D Laplace transforms applied to fractional diffusion equations, Applied Numerical Mathematics, Vol. 53 (Iss. 1) 2005 pp. 73-88.

Jourine, S., Valkó, P.P. and Kronenberg, A.K. Modelling poroelastic hollow cylinder experiments with realistic boundary conditions. International Journal for Numerical and Analytical Methods in Geomechanics, Vol. 28 (Iss 12) 2004, pp 1189–1205.

Valkó, P.P. and Abate, J. Comparison of Sequence Accelerators for the Gaver Method of Numerical Laplace Transform Inversion, Computers and Mathematics with Application, Vol. 48 (Iss.3-40) 2004 pp. 629-636.

Abate, J. and Valkó, P.P. Multi-precision Laplace transform inversion, International Journal for Numerical Methods in Engineering, Vol. 60 (Iss. 5-7) 2004, pp 979–993.

Valkó, P.P. and Abate, J. Numerical Laplace inversion in rheological characterization, Journal of Non-Newtonian Fluid Mechanics, Vol. 116 (Iss. 2-3) 2004, pp 395–406.

Monday, July 25, 2016 at 10:54:27 AM Central Daylight Time

Subject: RE: promotion letter request
Date: Monday, June 20, 2016 at 1:27:57 PM Central Daylight Time
From: Dean, Rick H
To: Olson, Jon
CC: Stickney, Stephanie

Jon,

I am sorry that I will not be able to participate in evaluating John Foster for promotion.

I have spent very little time reading papers dealing with the subject of peridynamics so I do not think I can provide an adequate evaluation of John's qualifications without considerable effort on my part.

I appreciate being asked to participate in the promotion process, but I do not think I will be able to commit to the time that would be required to provide a proper evaluation.

Rick Dean

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, June 17, 2016 1:25 PM
To: Dean, Rick H <Rick.H.Dean@conocophillips.com>
Cc: Stickney, Stephanie <stickney@austin.utexas.edu>; Olson, Jon <jolson@austin.utexas.edu>
Subject: [EXTERNAL]promotion letter request

Hi Rick – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

The academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!
Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Thursday, August 11, 2016 at 12:14:55 PM Central Daylight Time

Subject: FW: promotion letter request
Date: Wednesday, August 10, 2016 at 9:21:11 AM Central Daylight Time
From: Olson, Jon
To: Brooks, Allison B, Stickney, Stephanie

This declination is missing for Foster.

Jon E. Olson, PhD, PE
Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin
512-471-7375

From: Holditch, Stephen A [mailto:holditch@tamu.edu]
Sent: Tuesday, July 05, 2016 10:30 AM
To: Olson, Jon
Cc: Holditch, Stephen A
Subject: RE: promotion letter request

Jon,

I am not sure I am the right person to write a letter for Foster. I know nothing about his specialty and I am not impressed with his publications for most of his career as I do not see how they fit well in Petroleum Engineering. I guess it is ignorance on my part.

Maybe someone like Akhil Datta-Gupta would do a better job in writing the letter..

Sorry,
Steve

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Friday, June 17, 2016 1:28 PM
To: Holditch, Stephen A
Cc: Stickney, Stephanie; Olson, John
Subject: promotion letter request

Hi Steve – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Monday, August 29, 2016 at 10:55:06 AM Central Daylight Time

Subject: FW: Foster promotion letter request
Date: Sunday, August 28, 2016 at 7:45:34 PM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

Another no for Foster.

Jon E. Olson
Chairman and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Ortiz, Michael [mailto:ortiz@aero.caltech.edu]
Sent: Sunday, August 28, 2016 11:47 AM
To: Olson, Jon
Subject: RE: Foster promotion letter request

Dear Jon: Sorry for the delay and thank you for the reminder. I have taken the opportunity to take another look at John T. Foster's record in detail. It seems to me that John's main contributions are in the field of peridynamics. Not being an expert on that subject, I do not feel that I can give an authoritative assessment of the level and originality of John's contributions. This recusal should not be construed in any way as an expression lack of support for John's promotion. Hoping to be of more help in the future, best regards - Michael

Professor Michael Ortiz
Frank and Ora-Lee Marble Professor
of Aeronautics and Mechanical Engineering
Mail Code 105-50
California Institute of Technology Pasadena, CA 91125
Phone: (626) 395-4530
E-mail: ortiz@caltech.edu
http://www.ortiz.caltech.edu/~ortiz/home.shtml

From: Olson, Jon [mailto:jolson@austin.utexas.edu]
Sent: Sunday, August 21, 2016 10:03 AM
To: Ortiz, Michael
Subject: FW: Foster promotion letter request
Importance: High

Michael - Here is the Foster information again if you don't have it handy. Anything you can do would be helpful. Sorry again I didn't follow up sooner. Thanks. -Jon

Jon E. Olson
Chairman and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Olson, Jon
Sent: Tuesday, July 12, 2016 3:04 PM
To: ortiz@aero.caltech.edu

Cc: Olson, Jon (jolson@austin.utexas.edu); Stickney, Stephanie
Subject: FW: promotion letter request

Dear Dr. Ortiz - I am writing to check to see if you received my promotion letter request for John Foster date June 17. The letter deadline was July 15. I can wait longer if necessary, but I would like to know as soon as possible if you agree to do the writing, so that I can look for alternates if necessary. Thanks!

-Jon

Jon E. Olson, PhD, PE
Chairman and Professor
Petroleum and Geosystems Engineering
The University of Texas at Austin
512-471-7375

From: Olson, Jon
Sent: Friday, June 17, 2016 1:35 PM
To: 'ortiz@aero.caltech.edu'
Cc: Stickney, Stephanie; Olson, Jon (jolson@austin.utexas.edu)
Subject: promotion letter request

Dear Dr. Ortiz – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

Monday, July 25, 2016 at 10:53:41 AM Central Daylight Time

Subject: Re: promotion letter request
Date: Monday, June 20, 2016 at 9:06:58 AM Central Daylight Time
From: John Rudnicki
To: Olson, Jon
CC: Stickney, Stephanie

Dear Professor Olson,

I am sorry but I am going to decline your request. I have looked over Dr. Foster's cv. There is very little overlap between what he does and I do and I am largely unfamilar with the kind of work he does. I do not think I could provide an effective evaluation.

John W. R.

On Fri, Jun 17, 2016 at 1:32 PM, Olson, Jon <jolson@austin.utexas.edu> wrote:

> Dear Dr. Rudnicki – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.
>
> As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.
>
> Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.
>
> -Jon
>
> Link to Foster papers (too large to attach to email):
>
> https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE

Chairman and Frank W. Jessen Professor

Lois K. and Richard D. Folger Leadership Chair

Petroleum and Geosystems Engineering

The University of Texas at Austin

Austin, TX 78712

512-471-7375

www.pge.utexas.edu

--
John W. Rudnicki
Department of Civil and Environmental Engineering
and Department of Mechanical Engineering
Northwestern University, Evanston, IL. USA
john.rudnicki@gmail.com
(jwrudn@northwestern.edu)
847-491-3411 (Voice)
847-491-4011 (FAX)

Out now!
Fundamentals of Continuum Mechanics
www.wiley.com/buy/9781118479919

Available from Amazon

http://www.civil.northwestern.edu/people/profiles/rudnicki.html

Seeking is itself a barrier to wisdom. Pao-chih _/|_

Wednesday, July 27, 2016 at 11:41:41 AM Central Daylight Time

Subject: Fwd: promotion letter request
Date: Wednesday, July 27, 2016 at 10:19:19 AM Central Daylight Time
From: Olson, Jon
To: Stickney, Stephanie

FYI.

Jon E. Olson, Chairman and Professor
Petroleum & Geosystems Engineering
The University of Texas at Austin
Sent from my iPhone

Begin forwarded message:

From: "Soliman, Mohamed Y" <msoliman@Central.UH.EDU>
Date: July 25, 2016 at 8:26:17 AM CDT
To: "jolson@austin.utexas.edu" <jolson@austin.utexas.edu>
Subject: FW: promotion letter request

Jon,

I have already moved to UH; my contact info are given below.

I find it really difficult to pass a judgement on the CV that you sent me. Looking at his research, he is obviously a smart person with excellent publications, however most of them do not even belong to Petroleum Engineering field. I see classes taught in petroleum department in grey, and courses in mechanical engineering in black; what does this mean?

Frankly it looks like he belongs more to a mechanical or civil engineering department, rather than Petroleum Department.

To go further with this, I will need to see class evaluations; however I would rather not get involved in this process.

Regards,

M. Y. Soliman, PhD, PE, NAI
Department Chair
William C. Miller Chair
Petroleum Engineering Department
University of Houston
Office 713-743-8640
Cell 281-760-6754

COURSES TAUGHT
PGE 334 - Reservoir Geomechanics (UT S2015)

PGE 383 - Advanced Geomechanics (UT F2014, F2015)

PGE 323M - Reservoir Engineering III (UT F2015)

Introduction to High-Performance Computing (UTSA F2012, F2013, S2014)

ME 6043 – Continuum Mechanics (UTSA F2012, F2014)
ME 4603 – Finite Element Analysis (UTSA F2011)
ME 400/500 – Numerical Methods (UNM F2010)

From: "Olson, Jon" <jolson@austin.utexas.edu>
Date: July 15, 2016 at 1:15:57 PM CDT
To: "mohamed.soliman@ttu.edu" <mohamed.soliman@ttu.edu>
Cc: "Stickney, Stephanie" <stickney@austin.utexas.edu>, "Olson, Jon" <jolson@austin.utexas.edu>
Subject: promotion letter request

Hi Mohamed – I hear you are moving to Houston! Good luck. I know you are certainly busy this summer, but I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 31, but if you need more time let me know and I will see if I can accommodate you. We would really like your input.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!
Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

From: Stickney, Stephanie
To: Brooks, Allison B
Subject: Fwd: promotion letter request
Date: Tuesday, September 13, 2016 9:00:21 PM

FYI

Sent from my iPad

Begin forwarded message:

From: "Olson, Jon" <jolson@austin.utexas.edu>
Date: September 13, 2016 at 8:57:03 PM CDT
To: "Stickney, Stephanie" <stickney@austin.utexas.edu>
Subject: FW: promotion letter request

FYI.

Jon E. Olson
Chairman and Professor, Petroleum and Geosystems Engineering
512-471-7375

From: Azra Tutuncu [mailto:atutuncu@mines.edu]
Sent: Saturday, July 16, 2016 11:41 AM
To: Olson, Jon
Subject: Re: promotion letter request

Hi John,
I am a little tied up for the next few weeks and do not know the candidate at all. It will take time for me to write a recommendation for this caliper. Therefore, it might be beneficial to ask someone else who knows him and/or familiar with his publications. Have a good weekend.
Cheers,
Azra

Sent from my iPhone

On Jul 15, 2016, at 12:13 PM, Olson, Jon <jolson@austin.utexas.edu> wrote:

> Hi Azra – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.
>
> As you know, the academic promotion process depends heavily on the

role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 31, but if you need more time let me know and I will see if I can accommodate you. We would really like your input.

Good seeing you in Houston. Hope to run into you again soon.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

<Foster_CV_2016.pdf>
<Foster_Tutuncu.pdf>

Monday, July 25, 2016 at 10:55:15 AM Central Daylight Time

Subject: Re: promotion letter request
Date: Tuesday, July 12, 2016 at 5:45:57 PM Central Daylight Time
From: Mark D Zoback
To: Olson, Jon
CC: Stickney, Stephanie

Hi Jon,

I'm Checking last minute emails on my iPhone before starting a 10 day trek in the Pamir mountains.

I don't remember the email about John Foster. Perhaps I was planning to decline but failed to send an email. If so, I apologize. I don't know John or his work. I would not be a good person to evaluate his qualifications for promotion.

Regards,
Mark

sent from my iPhone

Mark D. Zoback
Professor of Geophysics
Stanford University
zoback@stanford.edu
Mobile (650) 468 3871

On Jul 13, 2016, at 4:01 AM, Olson, Jon <jolson@austin.utexas.edu> wrote:

> Hi Mark – I hope all is well in California. I am sure the summer is busy, but I am writing to check to see if you received my promotion letter request for John Foster date June 17. The letter deadline was July 15. I can wait longer if necessary, but I would like to know as soon as possible if you agree to do the writing, so that I can look for alternates if necessary. Thanks!
>
> -Jon
>
> Jon E. Olson, PhD, PE
> Chairman and Professor
> Petroleum and Geosystems Engineering
> The University of Texas at Austin
> 512-471-7375
>
> **From:** Olson, Jon
> **Sent:** Friday, June 17, 2016 1:31 PM
> **To:** 'zoback@stanford.edu'
> **Cc:** Stickney, Stephanie; Olson, Jon (jolson@austin.utexas.edu)
> **Subject:** promotion letter request
>
> Hi Mark – I have attached a letter requesting you to write a letter evaluating one of our assistant professors, John Foster, who is going up for promotion. I have also attached his CV and a link to 5 recent, significant papers by Dr. Foster.

As you know, the academic promotion process depends heavily on the role of outside, impartial evaluators. I hope we can count on you to help.

Thanks so much for your time and consideration. Please respond to this email as soon as is convenient as to whether you can participate. The deadline we are requesting for the letter is July 15.

-Jon

Link to Foster papers (too large to attach to email):
https://www.dropbox.com/sh/8xn9gjvuk4vuc67/AAAf7vU0KputKeGvXGPjehp_a?dl=0

Hook 'em!

Jon E. Olson, PhD, PE
Chairman and Frank W. Jessen Professor
Lois K. and Richard D. Folger Leadership Chair
Petroleum and Geosystems Engineering
The University of Texas at Austin
Austin, TX 78712
512-471-7375
www.pge.utexas.edu

<Foster_CV_2016.pdf>

<Foster_Zoback.pdf>

INSTITUTE FOR COMPUTATIONAL ENGINEERING AND SCIENCES
THE UNIVERSITY OF TEXAS AT AUSTIN

201 E. 24th Street, POB 4.102, C0200 • Austin, Texas 78712-1229 • 512-471-3312 • FAX 512-471-8694
www.ices.utexas.edu

Recommendation for Dr. John Foster to be promoted to an Associate Professor

September 13, 2016

Prof. Jon Olson
Chair, Petroleum and Geosystems Engineering

Dear Jon,

It is my pleasure to write these few words in support of promoting Dr. Foster to an Associate Professor. Ever since John has moved from Sandia Labs to UT, he has been very visible at ICES and ASE/EM Dept. He is a "core faculty" at ICES, and holds a courtesy appointment in the ASE/EM Dept. He gave a couple of ICES seminars, and had a presentation within the ICES Forum (a series of informal, non-technical seminars organized by Prof. Ivo Babuška).

Two years ago, John pulled me into a team writing an AFOSR proposal on fractional derivatives methodologies with applications to fluid-structure interaction problems. The team included several prominent mathematicians working on non-local theories (Max Gunzburger, Long Chen) and leading authorities on FSI problems (Yuri Bazilevs). John did a fantastic job pulling the team together and orchestrating a very consistent and exciting proposal. We lost (marginally) the competition but the PI (John) was offered to submit a "consolation prize proposal", and ultimately got me involved in the research on peridynamics and nonlocal mechanics. As I go deeper into the subject, I find the subject very exciting, both from the math and applications perspectives.

John has been also very involved in our professional organization - the US Association for Computational Mechanics. Last year he lead one of five groups competing for the organization of USACM Congress in 2019, and he won the competition. Through the leadership of Prof. J. Tinsley Oden, UT has had a long tradition of activities in USACM. The 2005 congress took place in Austin, and I am very happy to see it return to Austin in 2019 again.

Dr. Foster has joined UT after several successful years at Sandia and he is way more experienced and established that a typical Assistant Professor in this stage of his career. I am convinced that he deserves a tenure and should be promoted to an Associate Professor

position.

Please do not hesitate to contact me by E-mail or phone (my cell: 512-964-2032) if you need any extra information.

Best Regards,

Dr. Leszek Demkowicz

W. A. "Tex" Moncrief, Jr. Chair in Computational Engineering and Sciences II
Institute for Computational Engineering and Sciences (ICES), Assistant Director
Aerospace Engineering and Engineering Mechanics, Professor
Dept. of Mathematics, Professor
Editor in Chief, Computers and Mathematics with Applications
President, US Association for Computational Mechanics
E-mail: *leszek@ices.utexas.edu*